SmartScan Model 2400 Portable AEI Reader User Manual

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1. BRIEF OVERVIEW

The SmartScan Model 2400 Portable AEI Reader is a very versatile AEI tag reader. It is primarily used to verify AEI tag data or to capture track consist by reading the AEI tags on the rail vehicles.

Its two main components are a commercial Personal Data Assistant (PDA) and an AEI RF reader board along with a battery, housed in a rugged enclosure. An optional barcode reader is available.

The battery that provides power to the AEI reader electronics also provides power to the PDA, and the case protects the PDA from mishandling and weather.

Because the PDA has wireless network capabilities (both 802.11b and Bluetooth), AEI tag data can be easily sent directly to other computer systems (see Paragraph 2.5). AEI data is sent in a comma delimited text file or a file containing the T94 records. Either of these file types can be attached to an email or uploaded to an FTP server. The Model 2400 Portable AEI reader can send AEI data files directly to as many as seven email addresses in addition to an FTP server.

Some of the other capabilities of the SmartScan Model 2400 Portable AEI Reader are listed below:

- Displays AEI tag data in user-friendly format (see Figure 2).
- Allows manual entry of vehicle identification information in the event an AEI tag cannot be read (see Paragraph 11).
- Allows vehicles to be assigned to a track or a spot on a track (see Paragraph 4).
- Allows the user to assign track and spot names (see Paragraph 5.7).
- Allows the scanning of two tracks at the same time (see 2.3).
- Allows the use of special AEI tags that are programmed with track and spot information to eliminate the requirement of entering this information manually (see Paragraphs 7 and 8).
- Allows additional data to be added about vehicles (see Paragraph 3). There are twelve data fields available. The user can define and name seven of these fields. The other five fields are: two Maintenance Data fields, a Status field, a Consist field and a Comments field.
- Allows the use of special barcode labels to enter maintenance and status information about a rail vehicle (see Paragraph 5.15).
- Allows for the easy development of custom applications.
- Enables other vendors (OEMs) to develop special applications for the portable AEI reader (see Paragraph 9). The portable AEI readers allow other applications to

easily access tag and barcode data and send their generated data as files attached to emails or uploaded to an FTP server.

- Allows the portable reader to access data from other devices (scales, wayside sensors, etc.) via its Bluetooth connection and associate this data with AEI tag reads.
- Will eventually allow the portable AEI reader to talk directly to Bluetooth enabled GPRS phones and Global Positioning Systems (GPS).

2. QUICK START

2.1. Battery Operation

The portable reader has two batteries. The main battery is located in the pistol grip and is used to power the RF board and charge the battery in the iPAQ PDA.

To charge the main battery, plug the charger into the connector that is behind the portable reader's pistol grip and next to the USB connector. The blue light next to the USB connector should come on indicating that the main battery is being charged and the orange light on the PDA should begin to blink. When the main battery is being charged, the PDA's battery is also being charged. Please note that the portable reader will not read tags when it is being charged.

When the blue light goes out, the portable reader's main battery is charged. When the PDA's orange light stops blinking and stays on, its battery is charged.

Each time you pull the rocker switch in the portable reader's handle to read tags, the unit will begin charging the PDA's battery from the main battery. The PDA's battery will be charged for 10 minutes after the last time the rocker switch was pulled.

If the portable reader's charging status light turns red instead of blue when you are charging the portable reader, there is a problem with the battery or the battery charger and you should return both for repair.

Please note that the battery status displayed on the PDA's screen is for the PDA's battery only. It does not show the status of the portable reader's main battery.

2.2. Reading AEI Tags

To read an AEI tag, first turn on the portable reader's PDA by depressing the black switch at the top right corner of the PDA. The screen in Figure 1 or Figure 2 should be displayed. If neither screen is displayed, use a pen to depress the reset button. The reset button is located on the backside of the portable reader's case on the left. This will cause the SmartScan program to restart.

Figure 1 - SmartScan Information Display

Figure 2 - AEI Tag Display

There is a two-position rocker switch on the portable reader's pistol grip (see Figure 3). Pressing down on the top part of this switch will cause the portable reader to read AEI tags. Pressing down on the bottom part of this switch will cause the portable reader to read barcodes (if the portable reader is equipped with the optional barcode reader).

Figure 3 - SmartScan Portable Reader Side View

To read an AEI tag press down the top part of the rocker switch while pointing the portable AEI reader at the AEI tag.

You will hear a beep and the display will be updated when the AEI tag is read. Figure 2 is an example of what the screen will display when an AEI tag that contains rail vehicle information is read. Other displays will appear when AEI tags with track or track spot information are read.

If a tag fails to be read after 5 seconds, release the rocker switch button. You can then manually enter vehicle identification information (see Paragraph 2.6).

2.3. Placing Rail Vehicles on Tracks

Prior to reading rail vehicle AEI tags, track information should be entered into the portable reader.

There are two methods for assigning rail vehicles to a track.

The first is to equip each track with a Track AEI tag (see Paragraph 7 on the format of the Track tag). These are placed at each end of the track and contain the track name and the orientation of the track.

To start taking inventory use the portable AEI reader to read one of these tags before reading the tags on the rail vehicles. When a Track AEI tag is read the display in Figure 4 will be shown.

Figure 4 - Active Track Display

Two tracks can be active at any given time. This allows rail vehicles on two adjacent tracks to be scanned in the same session.

When two tracks are active, rail vehicles can be moved back and forth between the two tracks by depressing the Switch Track button shown in Figure 2 or by reading the same vehicle's AEI tag a second time. Each time the same vehicle's AEI tag is read, the portable reader will switch the vehicle to the other track.

The portable reader will assign all of the rail vehicles to one of up to two active tracks until a second Track tag on one of the active tracks is read or until the user issues a command to the portable reader to stop taking inventory on that track (see Paragraph 2.4).

The second method is to manually enter the track information into the portable reader. To manually enter a track name, tap the Menu button on the screen. This will cause a pop-up menu to appear (see Figure 5).

Figure 5 - Start Track Inventory Menu

Select the Start Track Inventory menu item by tapping on it. This will cause the Start Track Inventory dialog to be displayed (see Figure 6).

Figure 6 - Start Track Inventory Dialog

In the Start Track Inventory dialog you will either select a previously entered track name, by selecting a name from the pull down list (which appears when you tap on the down triangle located on the right side of the Track field), or manually enter a new track name. To enter a new track name, tap on the keyboard icon located near the bottom right of the screen. This will cause a keyboard to be displayed. Tap on the characters of the new name.

After you have entered a new track name, this name will appear in the Track pull down list when this dialog is displayed again.

The track's inventory orientation can be entered by selecting a direction item from the Inventory Orientation field's pull down list.

The default track inventory orientation can be set by going to the Default Values dialog (see Paragraph 5.4).

Some tracks can assign spot names to individual locations on the track. If you want to assign rail vehicles to individual track spot locations, check the Use Track Spots checkbox.

When this dialog is completed, tap on the OK button. This will cause the Active Track display to appear (see Figure 4).

2.4. Ending Track Inventory

There are two ways to end taking track inventory. The first method is to read a Track AEI tag on one of the active tracks.

The second is to tap on the Menu button. This will cause a pop-up menu to appear (see Figure 7).

Figure 7 - End Track Inventory Menu

Select the End Track Inventory item for the track on which you are done taking inventory. This will end inventory for the track. All subsequent vehicle tag reads will not appear on that track until Start Track Inventory is again selected or a Track tag is read.

When track inventory is ended, the portable reader will ask if you want to send the track inventory to another system. If you respond "Yes", the Send Track Inventory dialog shown in Figure 8 will be displayed.

2.5. Send Track Inventory

The Send Track Inventory dialog (see Figure 8) allows you to enter the track inventory's file format and how the track inventory will be sent.

The portable AEI reader can send track inventory in three types of file formats. The T94 format is the standard format used for communication between wayside AEI readers and railroads' host computers. Information about this format can be found in the Association of American Railroads' AEI Standard S-918, which can be downloaded from our web page at www.aeitag.com.

The second format is a comma delimited text file. This format uses Electronic Data Interchange (EDI) type records. This file has many different types of records and is generally used for computer-to-computer communications. For information about this file format go to Paragraph 14.

The third format is also a comma delimited text file. We refer to it has the Excel file format since it was designed so that it can be easily imported into most commercial word processing, spreadsheet and database programs. For information about the Excel file format go to Paragraph 14.

Track inventory in any file format can be sent as an attachment to an email and/or a file directly sent to an FTP server. To use either of these options the email server name or FTP server name, user name and password must be entered into the portable reader's PDA prior to attempting to send inventory. Information on setting up the email or FTP functions can be found in Paragraphs 5.9 or 5.12, respectively. Files can be sent to as many as seven email addresses. For information on entering email addresses into the system go to Paragraph 5.11.

Softrail also maintains an FTP server for receiving track inventory. Softrail uses this server to provide a data redistribution service to portable reader users. Softrail can forward track inventory received on Softrail's FTP server to multiple email addresses, FTP servers or computers using dialup connections.

For more information about this service contact Softrail at 888 872-4612 or 724 942-1473.

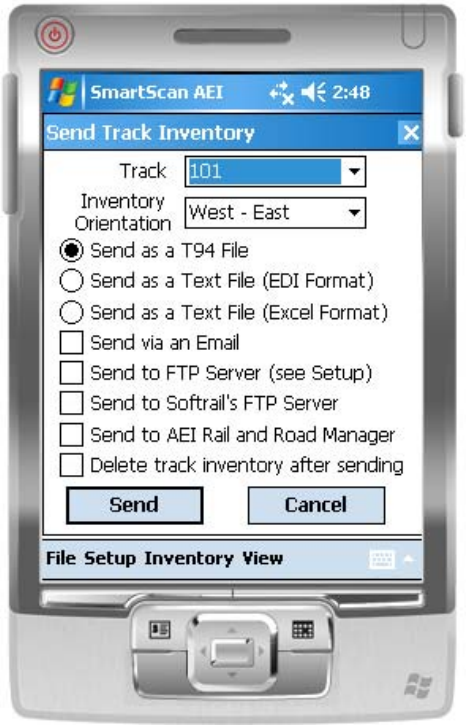

Figure 8 - Send Track Inventory Dialog

The portable AEI reader can also send track inventory to Softrail's AEI Rail and Road Manager program directly via a TCP/IP connection (see Paragraph 5.9).

For more information about the AEI Rail and Road Manager software program contact Softrail at 888 872-4612 or 724 942-1473 or go to Softrail's web page at www.aeitag.com.

Once the Send button is tapped the message or messages will be placed into a queue for transmission. Up to 200 messages can be in the message queue waiting for transmission.

When the portable AEI reader sees that there is a message to transmit, it will attempt to make an internet connection.

The portable AEI reader connects to the internet using its integral wireless 802.11b radio or a USB connection to a local computer that has access to the internet.

Normally the portable AEI reader's wireless radio is turned off to conserve battery life. When there are messages to be sent the portable reader turns the radio on and tries to make a connection. A blue light at the top left of the portable reader's PDA will come on when the radio is turned on. This light will turn green when a connection is made (usually for a few seconds) and turn off when all messages are sent.

If a user is in the field and is in a location that does not have good radio coverage, the portable reader will turn the radio off after 30 seconds and wait another 5 minutes before trying to transmit the messages again.

When a user moves to an area that has better radio coverage, the portable reader will automatically send all pending messages.

The wireless feature can be turned off if you don't want to use it. Go to Paragraph 5.9 for more information.

To find the status of pending transmission messages tap the View menu item near the bottom of the screen and then select the Message Status item. This will cause the Message Status dialog shown in Figure 9 to be displayed.

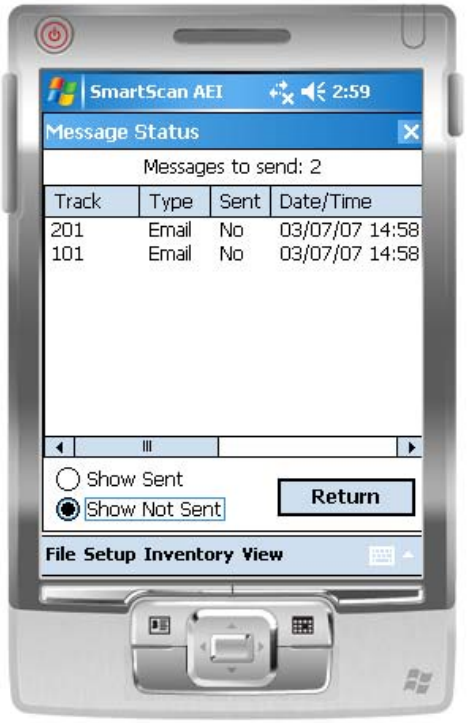

Figure 9 - Message Status Dialog

The Message Status dialog shows all of the messages that are waiting to be sent and the last 100 messages that were sent.

2.6. Manual Entry of Vehicle Identification

In situations where a rail vehicle has a bad tag or is missing a tag vehicle identification information can be manually entered. To manually enter vehicle identification information, tap anywhere on the screen, which will cause a pop-up menu to be displayed (see Figure 7). Select the Manually Enter Tag Info menu item, and the Manual Entry dialog shown in Figure 10 will appear.

Figure 10 - Manual Entry Dialog

To display the keyboard, tap the white keyboard icon in the bottom right corner. Tapping this icon a second time will cause the keyboard to disappear.

The vehicle initial can either be selected from a list of previously entered initials in the Vehicle Initial field's pull down list (which appears when you tap on the down triangle located on the right side of the Vehicle Initial field), or a new initial can be typed in using the keyboard. To enter a new initial, tap on the keyboard icon located near the bottom right of the screen. This will cause a keyboard to be displayed. Tap on the characters of the new name.

After you have entered a new initial, this new initial will appear in the Vehicle Initial's pull down list when the dialog is displayed again.

A default vehicle initial can be set by going to the Default Values dialog (see Paragraph 5.4).

The Vehicle Number field must contain between 1 to 6 digits to be accepted. The portable reader will insert any leading zeroes. Numbers can be quickly entered into this field by tapping the number buttons under this field. It is not necessary to tap on the Vehicle Number field prior to tapping on these number buttons.

The Vehicle Type can be either Locomotive or Railcar and is selected from this field's pull down list.

When the OK button is tapped, the screen shown in Figure 11 will be displayed.

Figure 11 - Manually Entered Vehicle Display

This display shows that a vehicle's data was manually entered and the time the entry occurred. As with vehicles entered via tag reads, manually entered vehicle information can be included in track inventory and can be sent to other systems via the internet.

3. ADDITIONAL DATA FIELDS

When a vehicle is entered into the portable reader via an AEI tag read or manual entry, additional data can be entered about the vehicle and passed to other systems (only in a text file format, T94 does not support these additional data fields).

The additional data fields are broken down into three categories. These are:

- Vehicle comments
- System defined fields such as maintenance, status and consist
- User defined fields

There are two methods for entering data into these fields. Data can be entered manually through a group of displays or entered via barcodes (if the portable reader is equipped with an optional barcode reader). For more information about entering information via barcodes go to Paragraph 5.15.

To manually enter information about a rail vehicle into these fields, tap the Menu button on the screen. This will cause a pop-up menu to be displayed (see Figure 7). Select the appropriate menu item for the type of additional data to be entered.

3.1. Vehicle Comments

When the Vehicle Comments menu item is tapped, the Vehicle Comments dialog shown in Figure 12 will appear.

Figure 12 - Vehicle Comments Dialog

To display the keyboard, tap the white keyboard icon in the bottom right corner. Tapping this icon a second time will cause the keyboard to disappear.

Up to 200 characters of comments about a vehicle can be entered.

3.2. Vehicle System Defined Fields

When the Vehicle Systems / Maintenance Fields menu item is tapped, the System Defined Fields dialog shown in Figure 13 will appear.

Figure 13 - System Fields Dialog

To display the keyboard, tap the white keyboard icon in the bottom right corner. Tapping this icon a second time will cause the keyboard to disappear.

There are four system-defined fields. The user can enter any data into these fields or use each field's pull down list of previously entered values for the fields.

The system will remember all entries into these fields and add them to the fields' pull down lists the next time this dialog is displayed.

3.3. Vehicle User Defined Fields

When the Vehicle User Fields menu item is tapped, the User Fields dialog shown in Figure 14 will appear.

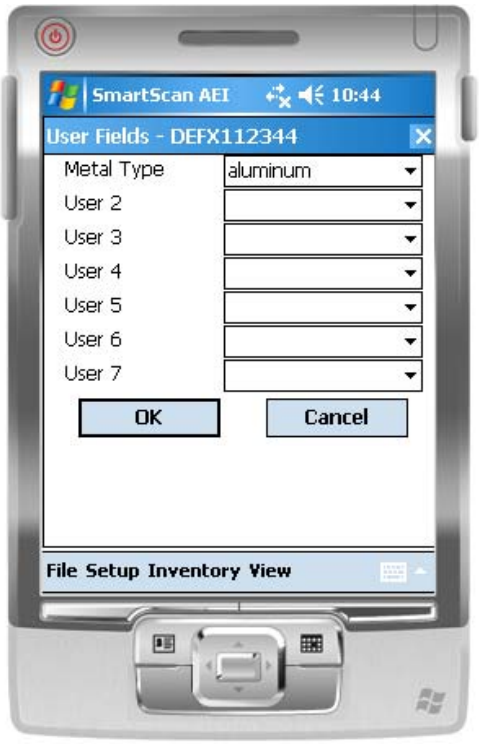

Figure 14 - User Fields Dialog

To display the keyboard, tap the white keyboard icon in the bottom right corner. Tapping this icon a second time will cause the keyboard to disappear.

The user can specify up to seven fields of data that will be maintained for a rail vehicle. The name of each field can be entered using the User Field Name Setup dialog (see Paragraph 5.8).

The user can enter any data into these fields or use the fields' pull down lists.

The system will remember all entries into these fields and add them to the fields' pull down lists the next time this dialog is displayed.

3.4. Rail Vehicle Data Field Display

When a rail vehicle tag is read, the AEI Tag display is shown (see Figure 2). When data is entered into one the vehicle's data fields, the Rail Vehicle Data Field display in Figure 15 will be shown.

Figure 15 - Rail Vehicle Data Field Display

This display shows all of the user entered data for the rail vehicle with the exception of the Comments field.

4. SCREEN DISPLAYS

There are six screen displays. These are:

- SmartScan Information Display
- AEI Tag Display
- Rail Vehicle Data Field Display
- Active Track Display
- Current Spot Tag Display
- Current Bar Code Display

You can cycle through these displays in the above order by tapping anywhere on the top half of the screen. Each time you tap, the next screen will appear (see Figure 16). If a rail vehicle tag has not been read, the AEI Tag and Rail Vehicle Data Field displays will not appear.

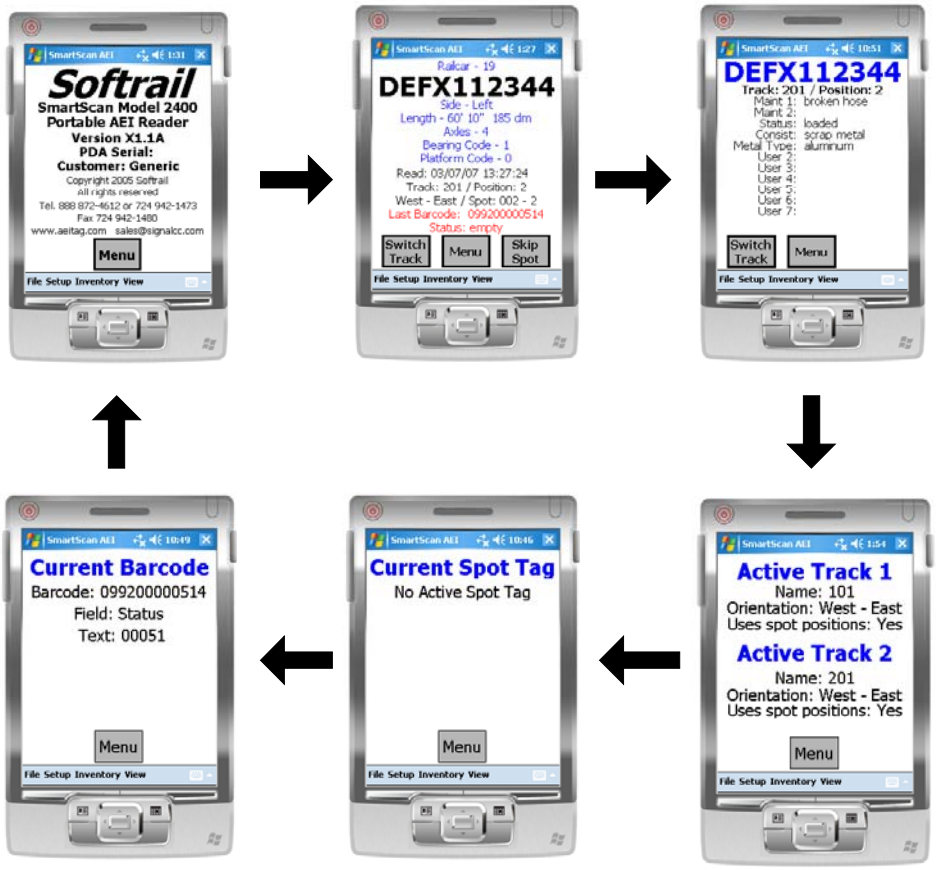

Figure 16 - Screen Displays

5. SETUP FUNCTIONS

There are a number of setup functions. These functions are used to configure the portable AEI reader to perform various tasks and reduce repetitive input.

The following is a list of setup functions:

- Setup Password - allows the user to enter a password to prevent unauthorized users from changing the setup parameters.
- Contact information - used when sending emails and maintenance information.
- Default values - allows the user to enter a default vehicle initial for the manual vehicle entry dialog and default track orientation when the user starts taking track inventory.
- Memorized Data Maintenance - many data fields have pull down lists of previously entered data. This function allows the user to edit the pull down (memorized) lists.

- Portable Reader Identifier - allows the user to assign a name to the portable reader.
- Track Setup - allows the user to edit track names and add T94 setup data for a track.
- User Defined Field Names Setup - allows the user to enter the names of user defined fields.
- AEI TCP/IP Setup - used to enter the IP address of the computer hosting Softrail's AEI Rail and Road Manager program.
- Email Setup – used to enter email outbound server information for sending data via email.
- Email Send to Addresses - used to enter up to seven email addresses that will receive AEI data.
- FTP Setup - used to enter FTP server information for sending files to an FTP server.
- Network Communications - used to enable or disable wireless (80211.b) or Bluetooth communications.
- Automatic Clock Update - used to enable the automatic updating of the portable reader's time and date.
- Barcode Setup - used to specify the barcode parameters for barcodes that are used to enter data into a rail vehicle's data fields.
- Barcode Text - used to enter a list of barcode numbers that are translated by the portable reader into text.
- OEM Folder Setup - used to define where the OEM's application can find files containing AEI tag data and where the OEM's application should save files that are to be transmitted via email or to an FTP server.

The following paragraphs define the setup functions in more detail.

5.1. Methods for Entering Setup Data

Because the portable reader has many capabilities, there are a large number of setup parameters. To make the setup easier and to transfer setup parameters from one portable reader to another, a special Windows desktop program has been developed that allows users to upload and download parameters from a portable reader to a desktop computer in order to edit the setup parameters on the desktop. The SmartScan Portable Reader Setup program and manual is included with each SmartScan Model 2400 Portable Reader.

To edit the setup parameters on the portable reader, select the Setup menu item. This will cause a pop-up menu to appear with a list of all of the setup functions.

5.2. Setup Password

The Setup Password function allows users to enable password protection so unauthorized personnel cannot make changes to any of the Setup Parameters in the portable reader.

To set up password protection select the Setup Password menu item under the Setup menu.

This will cause the Setup Password dialog shown in Figure 17 to be displayed.

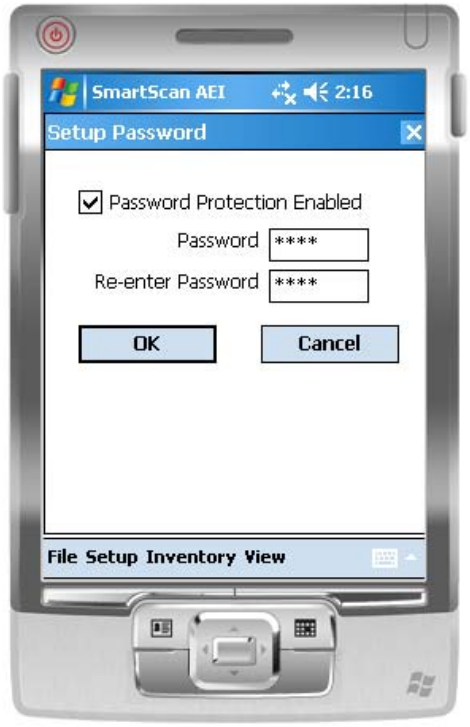

Figure 17 - Setup Password Dialog

If the password protection is enabled, when the user tries to change any of the setup parameters, the portable reader will ask for the password before making the change.

Once the Setup Parameters are unlocked by entering a password they will stay unlocked until the Lock Setup Parameters menu item under the Setup menu is selected.

5.3. Contact Information Setup

To set up contact information tap the Contact Information menu item under the Setup menu.

This will cause the Contact Information dialog shown in Figure 18 to be displayed.

Figure 18 - Contact Information Dialog

Information entered in this display is used in the body of some email messages and in maintenance messages sent to Softrail.

5.4. Default Values Setup

To set up default values tap the Default Values menu item under the Setup menu.

This will cause the Default Values dialog shown in Figure 19 to be displayed.

Figure 19 - Default Values Dialog

Default values for vehicle initial and track orientation can be entered into the system. The default value for the vehicle initial is used when vehicle identification is manually entered into the portable reader.

The vehicle initial can either be selected from a list of previously entered initials in the Vehicle Initial field's pull down list (which appears when you tap on the down triangle located on the right side of the Vehicle Initial field), or a new initial can be typed in. To enter a new initial, tap on the keyboard icon located near the bottom right of the screen. This will cause a keyboard to be displayed. Tap on the characters of the new initial and then tap on OK.

After you have entered a new initial, the new initial will appear in the Vehicle Initial's pull down list when this dialog is displayed again.

The default track orientation is used when track inventory is started and the track name is entered.

5.5. Memorized Data Maintenance

For many fields the portable reader remembers previous entries so they can be easily reused by simply selecting them from a pull down list. This eliminates retyping of common data entries.

The portable reader has a function to maintain memorized lists of previously entered data. To access this function tap the Memorized Data Maintenance menu item under the Setup menu.

This will cause the Memorized Field Select dialog shown in Figure 20 to be displayed.

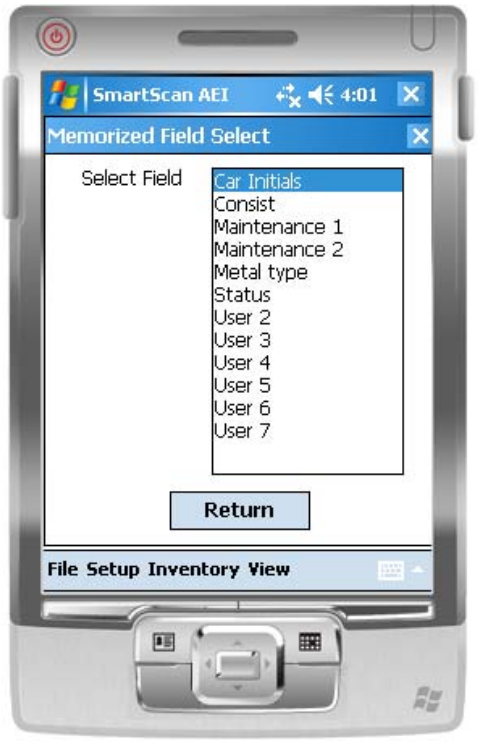

Figure 20 - Memorized Field Select Dialog

The Memorized Field Select dialog displays all of the fields on which the portable reader maintains memorized lists of data entries. To edit a particular field's list, tap on the particular field to be edited, and the Memorized Fields Data dialog will be displayed (see Figure 21).

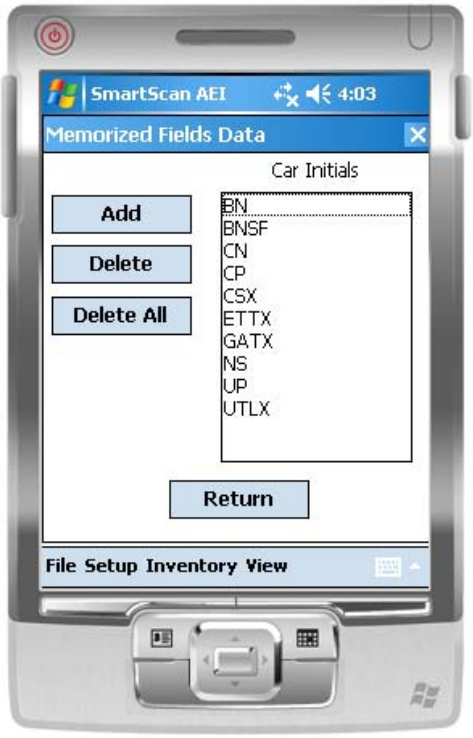

Figure 21 - Memorized Fields Data Dialog

Previously entered values can be deleted or new values can be added to each particular field's memorized list. To delete an entry, select the entry by tapping on it and then tap the Delete button. Only one entry can be selected at a time.

5.6. Portable Reader Identifier

The portable reader allows the user to assign a ten-character identifier to the portable reader. If the user does not define an identifier, the portable reader will use the last four characters of its PDA serial number as the identifier.

To access this function select the Portable Reader Identifier menu item under the Setup menu.

This will cause the Portable Reader Identifier dialog shown in Figure 22 to be displayed.

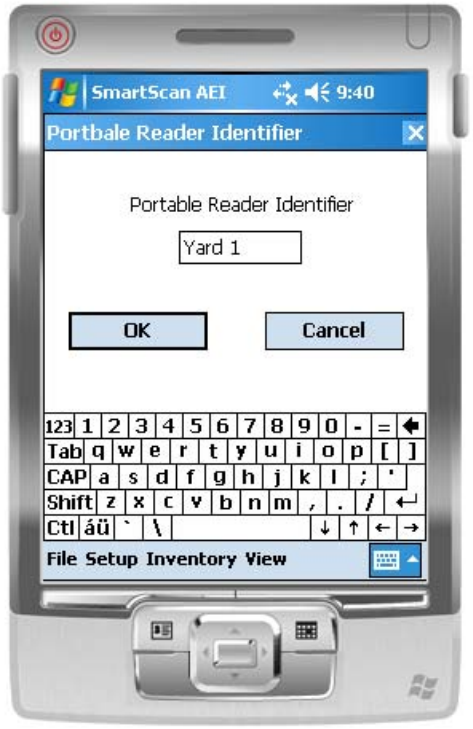

Figure 22 - Portable Reader Identifier Dialog

5.7. Track Setup

To set up track values tap the Track Setup menu item under the Setup menu. This will cause the Track Setup dialog shown in Figure 23 to be displayed.

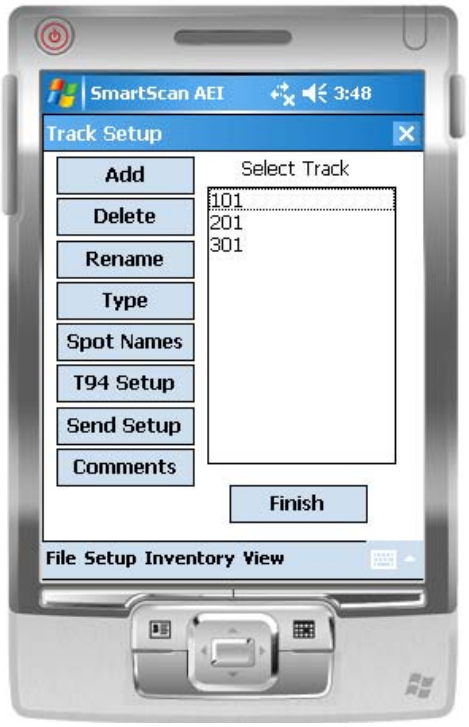

Figure 23 - Track Setup Dialog

Previously entered track names can be deleted or renamed, and new track names can be added. To delete or rename a track, first select the track by tapping on it and then tap the Delete or Rename button. Only one track name can be selected at a time.

To add a new track name tap the Add button, and an Add Track dialog will appear.

Tracks can be assigned to have spot locations. To designate that a track will have spot locations, select the track and tap the Type button.

Names can be assigned to track spots. To assign names to track spots, select the track and tap the Spot Names button. The Spot Name Setup dialog shown in Figure 24 will appear.

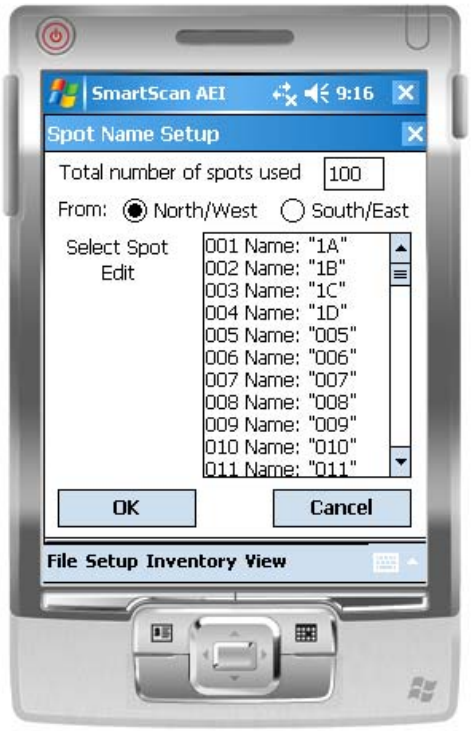

Figure 24 - Spot Name Setup Dialog

Up to 100 spot names can be assigned. The user can specify the direction in which the spot locations are listed. Spot names are by default given numerical names based on their position on the track (see Position 005 in Figure 24). To assign a new name to a spot, tap the spot name you want to change, and the Rename Track Spot dialog shown in Figure 25 will appear.

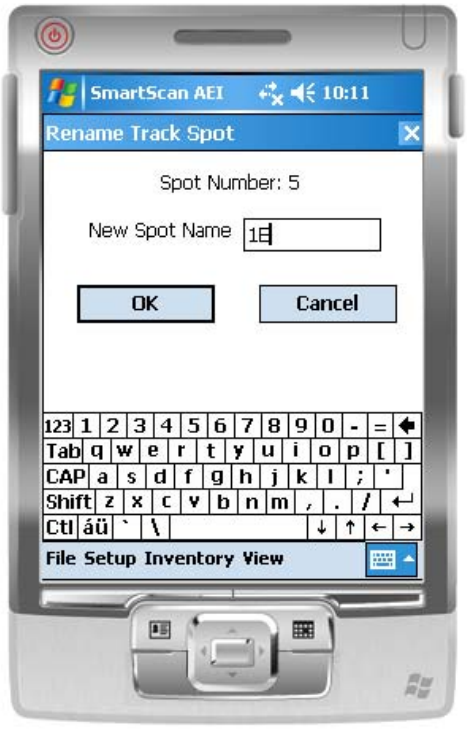

Figure 25 - Rename Track Spot Dialog

The T94 protocol has a TRK (track) segment. This segment is defined in Paragraph 2.26 in the Association of American Railroad's AEI Standard S-918, which can be downloaded from our web page at www.aeitag.com. T94 messages also have a requirement for an AEI site identifier (see Paragraph 2.1.5 in the S-918 standard). This information is entered by selecting a track and tapping the T94 Setup button. This will cause the T94 Track Data dialog to be displayed (see Figure 26).

Figure 26 - T94 Track Data Dialog

If data is to be transmitted in a T94 format, at a minimum, the 7-character AEM Site identifier must be entered. All other fields can be left blank.

When the user stops taking inventory on a track (see Paragraph 2.4), he can request that the track's consist be sent to other systems. To set the default parameters for sending track information, select a track via the Track Setup dialog (see Figure 23) and tap the Send Setup button. This will cause the Send Track Inventory dialog shown in Figure 27 to appear.

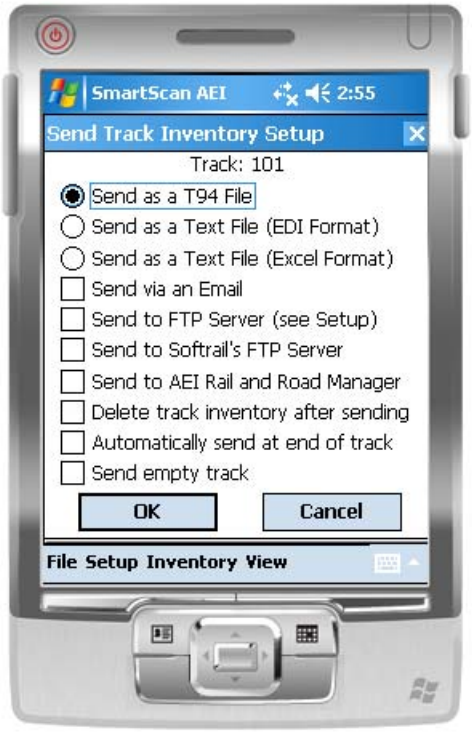
SmartScan AEI
2:55
Send Track Inventory Setup
Track: 101
Send as a T94 File
Send as a Text File (EDI Format)
Send as a Text File (Excel Format)
Send via an Email
Send to FTP Server (see Setup)
Send to Softrail's FTP Server
Send to AEI Rail and Road Manager
Delete track inventory after sending
Automatically send at end of track
Send empty track
OK
Cancel
File Setup Inventory View

Figure 27 - Send Track Inventory Setup Dialog

The portable AEI reader can send track inventory in three types of file formats. The T94 format is the standard format used for communication between wayside AEI readers and railroads' host computers. Information about this format can be found in the Association of American Railroads' AEI Standard S-918, which can be downloaded from our web page at www.aeitag.com.

The second format is a comma delimited text file. This format uses Electronic Data Interchange (EDI) type records. This file has many different types of records and is generally used for computer-to-computer communications. For information about this file format go to Paragraph 14.

The third format is also a comma delimited text file. We refer to it has Excel file format since it was designed so that it can be easily imported into most commercial word processing, spreadsheet and database programs. For information about the Excel file format go to Paragraph 14.

Track inventory in any file format can be sent as an attachment to an email and/or a file directly sent to an FTP server. To use either of these options the email server name or FTP server name, user name and password must be entered into the portable reader's PDA prior to attempting to send inventory. Information on setting up the email or FTP functions can be found in Paragraphs 5.9 or 5.12, respectively. Files can be sent to as many as seven email addresses. For information on entering email addresses into the system go to Paragraph 5.11.

Softrail also maintains an FTP server for receiving track inventory. Softrail uses this server to provide a data redistribution service to portable reader users. Softrail can forward track inventory received on Softrail's FTP server to multiple email addresses, FTP servers or computers using dialup connections.

For more information about this service contact Softrail at 888 872-4612 or 724 942-1473.

The portable AEI reader can also send track inventory to Softrail's AEI Rail and Road Manager program directly via a TCP/IP connection (see Paragraph 5.9).

For more information about the AEI Rail and Road Manager software program contact Softrail at 888 872-4612 or 724 942-1473 or go to Softrail's web page at www.aeitag.com.

The user can cause the track inventory to be automatically sent when he finishes taking track inventory by reading a Track AEI tag or by selecting the End Track Inventory menu item from a pop-up menu (see Paragraph 2.4).

Normally the portable reader will not send track data if the track does not contain any rail vehicles. However, this can be overridden by checking the “Send empty track” box in this dialog. This will cause a message to be sent when there are no rail vehicles on the track.

There are two comments fields associated with a track. To enter data into the comments fields, select a track via the Track Setup dialog (see Figure 23) and tap the Comments button. This will cause the T94 Comments and Email Text dialog shown in Figure 28 to appear.

The TRK segment in the T94 message has a field for comments. This function allows the user to enter comments about a track in the TRK segment prior to the data being sent. It also allows the user to enter comments about the track in the body text of an email if the message is being sent via an email.

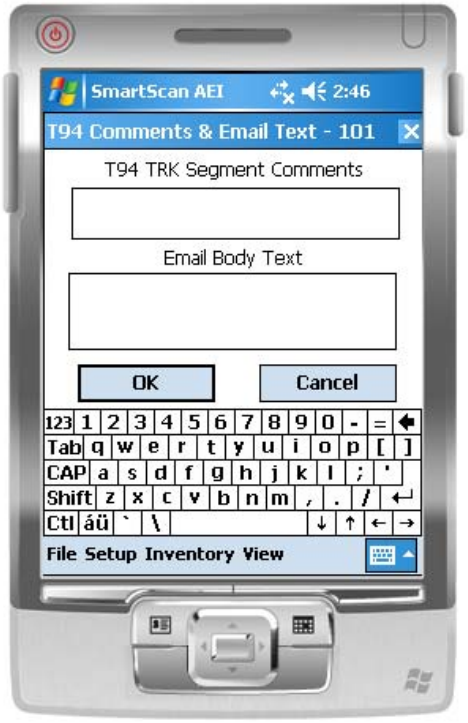

Figure 28 - Track Comments and Email Text Dialog

5.8. User Field Names Setup

The portable reader allows the user to define up to seven data fields. Data entered into these fields is maintained with the vehicle and can be sent to other systems in text file format.

The user can specify unique names for these fields by using the User Field Name Setup function. To access this function tap the User Field Names Setup menu item under the Setup menu.

This will cause the User Field Names Setup dialog shown in Figure 29 to be displayed.

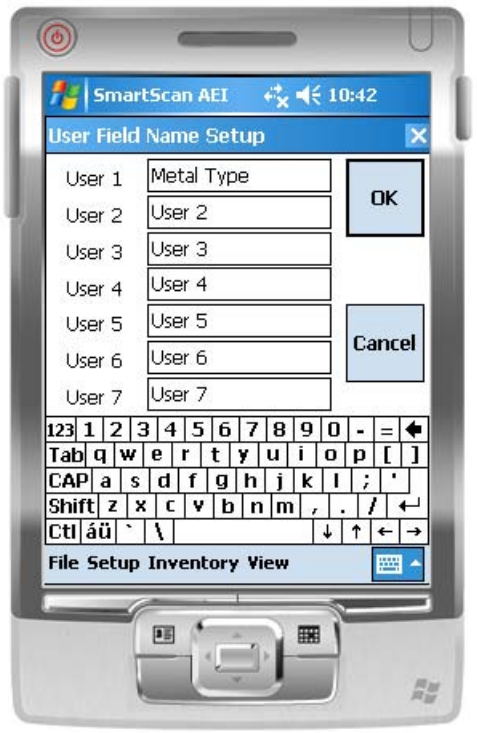

Figure 29 - User Field Name Setup Dialog

5.9. AEI RR TCP/IP Setup

The portable reader is designed to work in conjunction with Softrail's AEI Rail and Road Manager program.

The AEI Rail & Road Manager software was designed as a low cost package for tracking rail vehicle movements in a rail yard. This is a Windows based program that can run under the Windows 98, NT, 2000, ME, or XP operating system.

The AEI Rail & Road Manager software program allows the user to draw his/her own facility and move rail cars by reading their tags with a portable AEI reader or by manually dragging and dropping rail car icons from one track to another. By using input from wayside AEI readers, the program can also automatically track rail car movements.

A limited copy of the AEI Rail & Road Manager Program called AEI Rail & Road Manager Express is included with each SmartScan Model 2400 Portable AEI Reader.

To send track data to the AEI Rail and Road Manager program the portable reader needs to know the IP address of the computer hosting the AEI Rail and Road Manager program and the port to which the program is listening for a connection.

To find this information in the AEI Rail & Road Manager program, select the Portable Reader TCP/IP Setup menu item under the Portable Reader/Model 2400 Portable

Reader menu in the AEI Rail & Road Manager's menu bar. The dialog shown in Figure 30 will appear.

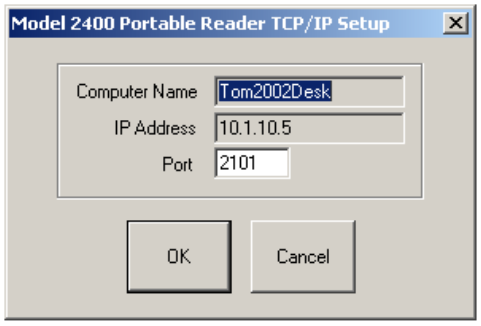

Figure 30 - Model 2400 Portable Reader TCP/IP Setup

The listening port is a setup parameter in the AEI Rail and Road Manager program.

To enter this information into the portable reader, tap the Communications Setup menu item under the Setup menu and then the AEI RR TCP/IP Setup button.

This will cause the AEI RR TCP/IP Setup dialog shown in Figure 31 to be displayed.

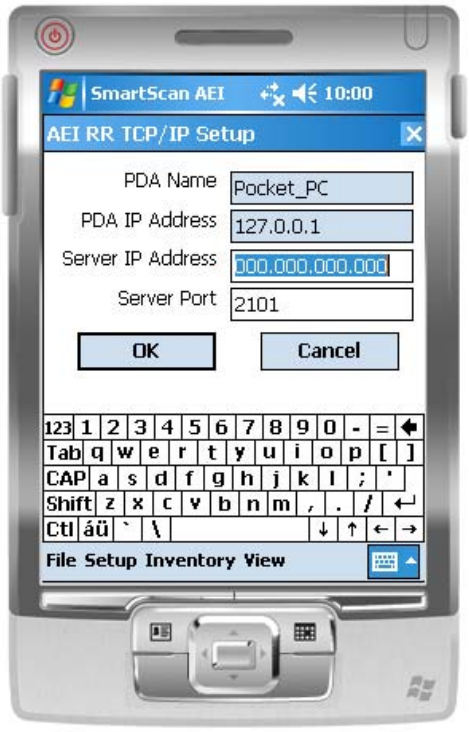

Figure 31 - AEI RR TCP/IP Setup Dialog

Enter the IP address and port information that was displayed in AEI Rail and Road Manager's Model 2400 Portable Reader Setup dialog (see Figure 30).

This display also shows the portable reader's PDA Name and the current IP address of the PDA.

5.10. Email Setup

To send track inventory via an email attachment, the portable reader must have information on how to access the user's outbound email server. To enter this information tap the Communications Setup menu item under the Setup menu and then the Email Setup button.

This will cause the Email Setup dialog shown in Figure 32 to be displayed.

Figure 32 - Email Setup Dialog

The Domain Name may not be required. Some outbound email servers require a different Domain Name than the Reply Address.

Some outbound email servers do not require a password, and this field can be left blank.

The reply address entered in this dialog is used as the reply address for all outbound emails.

The portable reader's PDA does not receive inbound emails.

5.11. Email Addresses

The portable AEI reader can send emails with track inventory information to as many as seven email addresses. To enter the email addresses tap the Communication Setup menu item under the Setup menu and then the Email Send to Addresses button.

This will cause the Email Address Setup dialog shown in Figure 33 to be displayed.

Figure 33 - Email Address Setup Dialog

5.12. FTP Setup

To send track data to an FTP server the portable reader must have information on how to access the FTP server. To enter this information tap the Communications Setup menu item under the Setup menu and then the FTP Setup button.

This will cause the FTP Setup dialog shown in Figure 34 to be displayed.

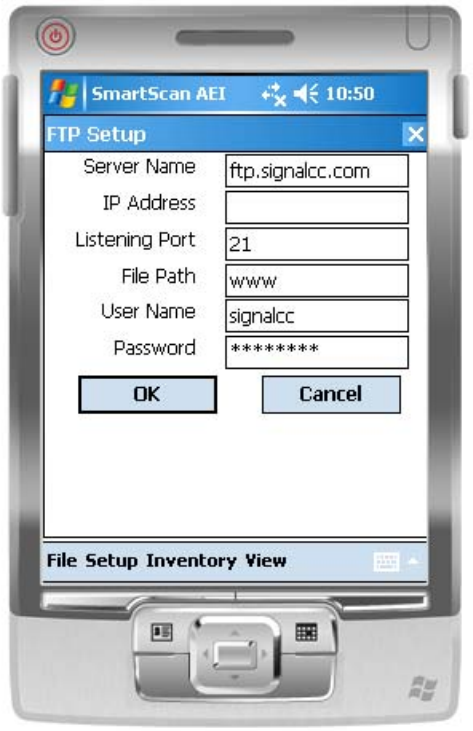

Figure 34 - FTP Server Setup Dialog

The FTP Server must have either a Server Name or an IP Address. If both are present the portable reader will use the Server Name.

The Listening Port is almost always 21.

The portable reader sends files to the FTP server. It does not retrieve files from the FTP server.

5.13. Network Communications

If you plan to communicate using the WiFi (802.1b) or Bluetooth radio networks you must enable their use. To enable the use of either of these radio networks tap the Communications Setup menu item under the Setup menu and then the Network Communication button. This will cause the WiFi / Bluetooth Enable dialog shown in Figure 35 to be displayed.

Figure 35 - WiFi / Bluetooth Enable Dialog

5.14. Automatic Clock Update

The portable reader can automatically update its date and time from either Softrail's AEI Rail and Road Manager software or the National Institute of Standards website.

To automatically update the portable reader's date and time from either of these locations this function must be enabled. To enable the automatic updating of the portable reader's date and time tap the Communications Setup menu item under the Setup menu and then the Automatic Clock Update button. This will cause the Automatic Clock Update dialog shown in Figure 36 to be displayed.

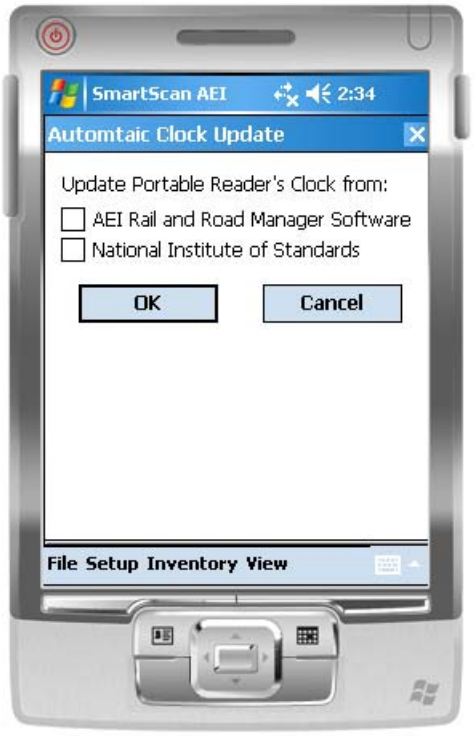

Figure 36 - Automatic Clock Update Dialog

5.15. Barcodes

The portable reader is designed to operate with an optional barcode reader. With a barcode reader information on barcodes can be used to quickly and easily enter data about a rail vehicle.

The portable reader is set up to read barcodes in the Universal Bar Code (UPC) format. The UPC format contains 12 digits. The first digit is usually 0 and specifies the Number Character System. The next ten digits are user specified and the last digit is a check digit.

Figure 37 shows examples of barcodes.

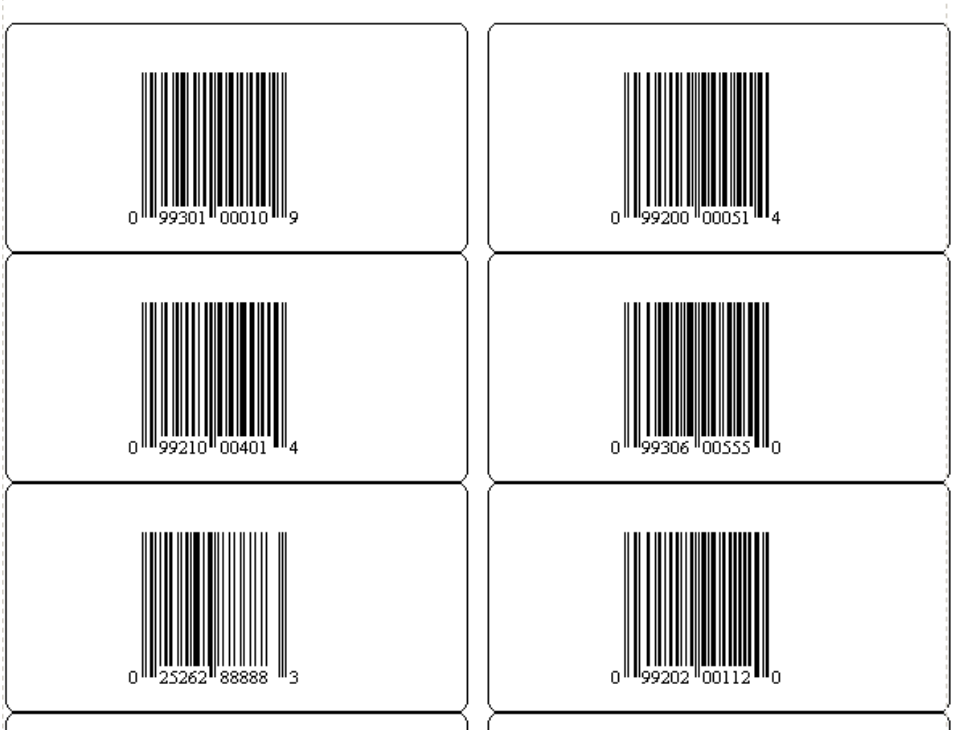

Figure 37 - Barcode Examples

The portable reader reads the barcode and enters the information into one of the 11 data fields (see Paragraph 3) that are associated with the rail vehicle. The user can specify into which of the eleven fields data from a barcode will be entered and can also specify if this is a special barcode that was developed by the user for use with the portable reader.

The portable reader looks at the second and third digit of the barcode to determine how to handle the barcode. If these two digits are not the same as those entered into the Default Start Code field in the Barcode Setup dialog (see Figure 38), then the barcode data will be entered in the field that is specified in the Default Bar Code Field in the Barcode Setup dialog.

In Figure 37 the UPC label at the bottom left does not have "99" in the second and third digits and, therefore, its data (025262888883) would be entered in the User 1 field for the rail vehicle.

To display the Barcode Setup dialog select the Barcode Setup menu item under the Setup menu.

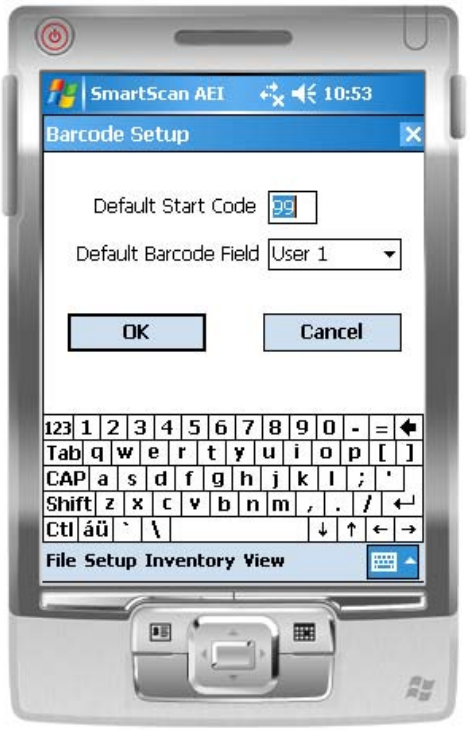

Figure 38 - Barcode Setup Dialog

The user can specify his own unique set of barcodes that have special meaning to the portable AEI reader. These barcodes have a special format that consists of three fields in the user specified ten-digit number of the bar code.

Figure 39 is a table that shows the barcode field structure.

Field Description	Position	Field Length	Data
Numeric System Character	1	1	Usually 0
Default Start Code	2-3	2	Any two-digit combination specified by the user.
Field Code	4-6	3	Specifies the field into which the barcode data will be entered. 200 = Status Field 201 = Consist Field 211 = Maintenance 1 Field 212 = Maintenance 2 Field 301 = User 1 Field 302 = User 2 Field 303 = User 3 Field 304 = User 4 Field 305 = User 5 Field 306 = User 6 Field 307 = User 7 Field
User Data Field	7-11	5	Five digits of data that will be entered into the field specified in the Field Code field.
Check Digit	12	1	Barcode check digit, not user specified.

Figure 39 - Barcode Field Structure

Based on this structure, the barcodes in Figure 37 cause the following:

- Barcode 0 9930100010 9 - 00010 entered into the User 1 field
- Barcode 0 9920000051 4 - 00051 entered into the Status field
- Barcode 0 9921100401 4 - 00401 entered into the Maintenance 1 field
- Barcode 0 9930600555 0 - 00555 entered into the User 6 field

- Barcode 0 2526288888 3 - 025262888883 entered into the User 1 field, since 99 is not in the second and third digit
- Barcode 0 9920200112 0 – 099202001120 entered into the User 1 field, since 202 is not a legal Field Code

The user can also have the portable reader translate the 5 digits of data in the barcode to a text string. For example, 00010 can be translated by the portable reader into "empty". Instead of 00010 appearing in the User1 field, the text string "empty" would appear.

To enter barcode text translations select the Barcode Text Translation item in the Setup menu. This will cause the Barcode Text Translation dialog shown in Figure 40 to appear.

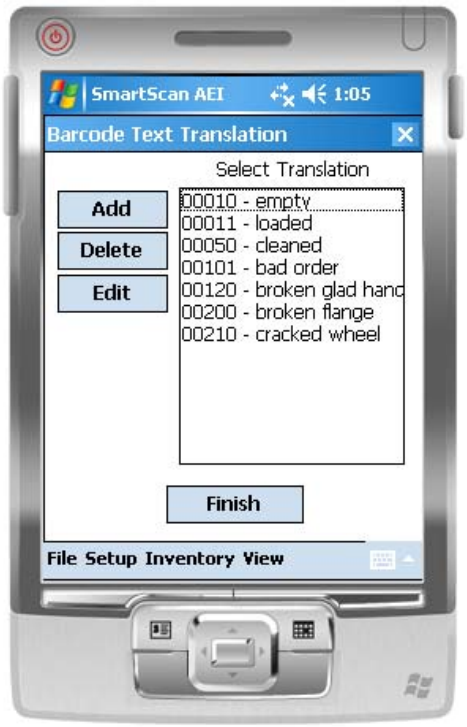

Figure 40 - Barcode Text Translation Dialog

To add a new barcode translation tap the Add button and the Barcode Add/Edit dialog shown in Figure 41 will appear.

To delete or edit a translation, select the translation in the list and tap the Edit or Delete button.

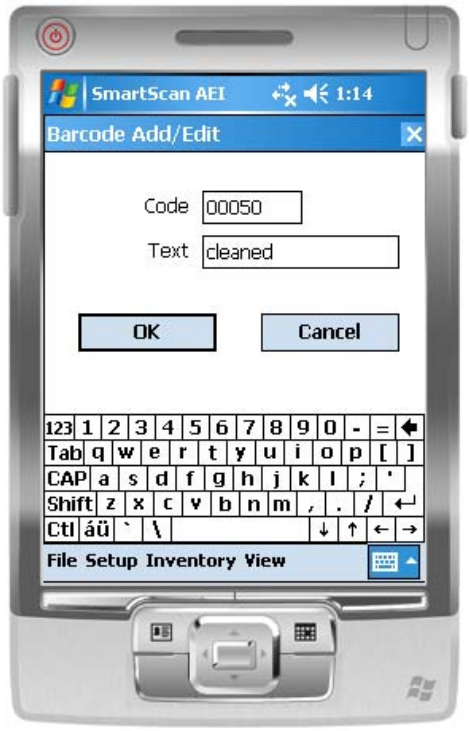

Figure 41 - Barcode Add/Edit Dialog

5.16. OEM Folder Setup

The portable reader is designed to make it easy for other companies (OEMs) to develop their own applications to incorporate into the portable reader.

To assist OEMs, the portable reader provides easy access to AEI tag data and provides a simple method for applications to send their data to other system via email attachments or as a file transfer to an FTP server.

Data transfer between the portable reader and an OEM's application is through a set of text files that are written into a specific folder in the portable reader's PDA.

The folder to which the files are written can be specified by using the OEM Folder Setup function.

To access this function tap the OEM Folder Setup menu item under the Setup menu.

This will cause the OEM Folder Setup dialog shown in Figure 42 to be displayed.

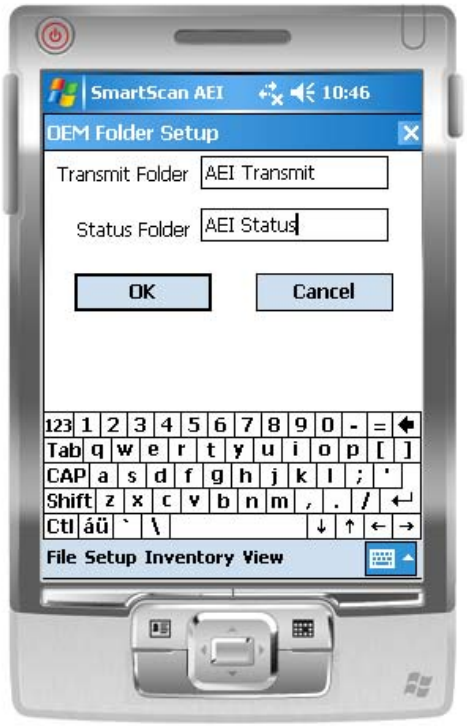

Figure 42 - OEM Folder Setup

The transmit folder contains the OEM files that are to be transmitted by the portable reader, and the AEI Tag Folder contains the file that has the AEI tag and barcode data.

For more information on interfacing OEM applications see Paragraph 9.

6. INVENTORY

The portable AEI reader has a number of inventory functions, which allows the user to add and delete rail vehicles from tracks, move rail vehicles from one track to another, and change vehicles' positions on tracks.

To access the inventory functions tap on the Inventory menu item, and the pop-up menu shown in Figure 43 will appear.

The inventory functions are:

- View Track Inventory
- Move Track Inventory
- Send Track Inventory
- Send All Track Inventory
- Find Rail Vehicle
- Delete All Track Inventory

Figure 43 - Inventory Menu

6.1. View Track Inventory

To access the View Track Inventory function, tap the View Track Inventory menu item. The Track Select dialog shown in Figure 44 will then appear.

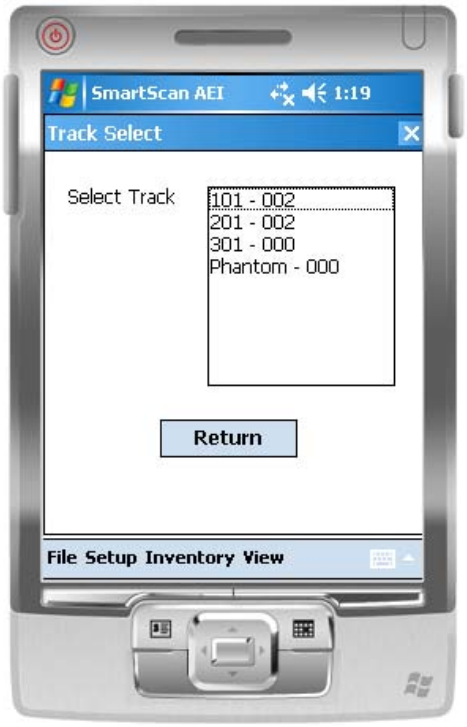

Figure 44 - Track Select Dialog

The Track Select dialog displays all of the tracks that have been entered into the portable reader. The number of rail vehicles that are on each track is displayed after the track's name in the list.

You will notice that at the end of the track list there is a track name called Phantom. The Phantom track is a fictitious track that is used as a temporary storage area in the portable reader for vehicles that have been deleted from one track, but have not yet been moved to a new track.

To view a track's consist, tap on the track name in the list, and the Track View dialog shown in Figure 45 will appear.

Figure 45 - Track View Dialog

The Track View dialog allows the user to add a vehicle, delete a vehicle, or delete all rail vehicles on a track.

6.1.1. Add Rail Vehicle

To add a rail vehicle, first select the location in the consist where you want the vehicle to be added by tapping on the vehicle in the list that will be behind the vehicle to be added. If you want, for example, to add a vehicle between NS 1526 and CSX 987654 in the list shown in Figure 45, tap on CSX 987654 and then tap the Add button. The Manual Entry dialog shown in Figure 10 will then be displayed.

6.1.2. Delete Rail Vehicle

To delete a vehicle, tap on the vehicle to be deleted, and then tap on the Delete button.

The Delete All button will delete all rail vehicles on the track.

6.1.3. Change Rail Vehicle Position on Track

The Advance button is used to change the position of a rail vehicle on a track. To change a position of a rail vehicle tap on the vehicle you want to move. Each time you tap the Advance button the vehicle will move up the list one position.

6.1.4. View and Change Rail Vehicle Data

The View button allows the user to view and modify data about a rail vehicle. To use this function, tap on the rail vehicle and then tap the View button. This will cause the Rail Vehicle dialog shown in Figure 46 to appear.

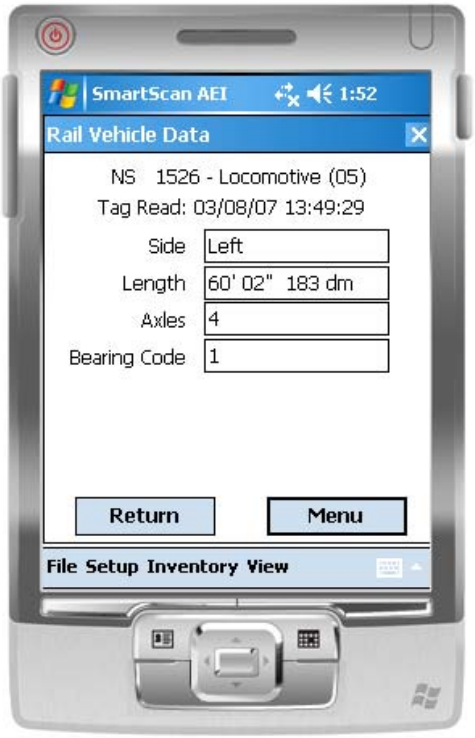

Figure 46 - Rail Vehicle Data Dialog

The Rail Vehicle Data dialog shows the tag information for the rail vehicle. To display the other data about the rail vehicle, tap the Menu button, and a pop-up menu will appear (see Figure 47).

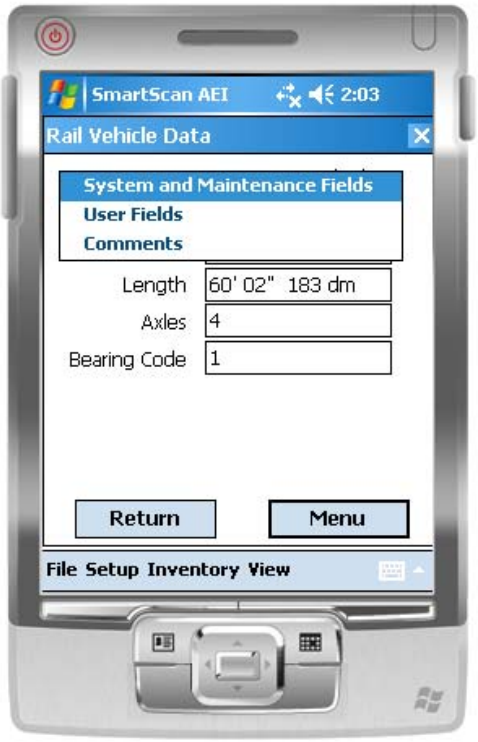

Figure 47 - Rail Vehicle Data Pop-up Menu

By selecting one of the pop-up menu items, the user can view and change the system defined fields (see Paragraph 3.2), the user defined fields (see Paragraph 3.3), and the vehicle comments (see Paragraph 3.1) for the displayed vehicle.

6.1.5. Reverse Track Inventory

Occasionally track inventory is initially reported in the wrong direction (West to East instead of East to West). The Reverse List button in Figure 45 allows the user to correct this error, by re-listing the track inventory in the opposite direction.

6.1.6. Track T94 and Email Comments

The TRK segment in the T94 message has a field for comments. This function allows the user to enter comments about a track in the TRK segment prior to the data being sent. It also allows the user to enter comments about the track in the body text of an email if the message is being sent via an email.

To access this function tap the Comments button in Figure 45, and the Comments and Email Text dialog shown in Figure 48 will appear.

Data entered into this dialog will be saved and used in all sent messages until it is changed by the user.

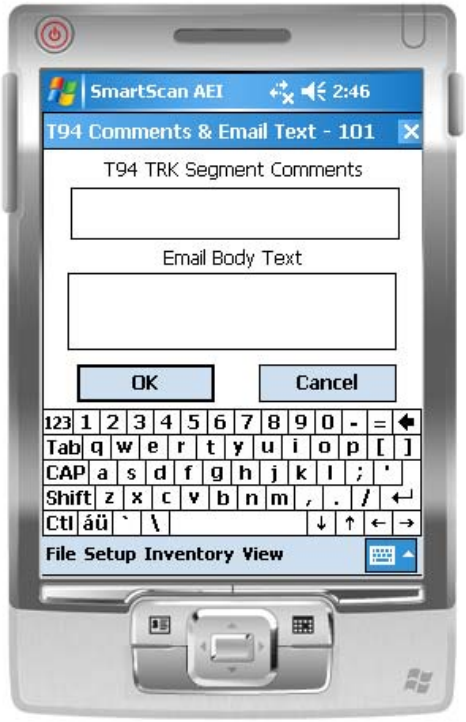

Figure 48 - Comments and Email Text Dialog

6.1.7. Send Track Inventory

Track inventory messages can be sent from the Track View dialog (see Figure 45) by tapping the Send button. This will cause the Send Track Inventory dialog shown in Figure 8 to be displayed (see Paragraph 2.5).

6.2. Move Track Inventory

To access the Move Track Inventory function, tap the Move Track Inventory menu item in the Inventory menu. The Track Select dialog shown in Figure 44 will then appear.

The Move Track Inventory function is very similar to the View Track Inventory function with two exceptions. First, it allows rail vehicles to be moved from one track to another. Second, it allows multiple rail vehicles to be selected at the same time.

After a track is selected in the Track Select dialog the Move Rail Vehicle From dialog shown in Figure 49 will appear.

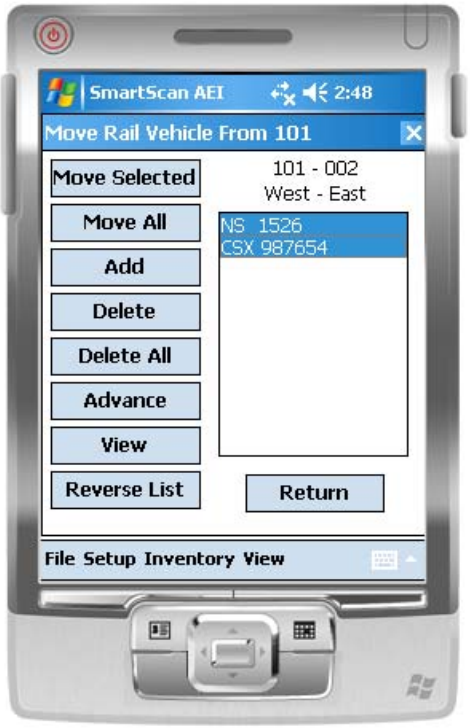

Figure 49 - Move Rail Vehicle From Dialog

6.2.1. Move Selected Rail Vehicles to Another Track

To move rail vehicles from one track to another, select the rail vehicles you want to move by tapping on each one and then tap the Move Selected button. This will cause the Track Select dialog shown in Figure 44 to reappear. Select the track to which you want to move the vehicles, and the Move Rail Vehicle To dialog shown in Figure 50 will appear.

Figure 50- Move Rail Vehicle To Dialog

If there are already rail vehicles on the track to which the rail vehicles are being moved, you can add the moved rail vehicles to the top or bottom of the list of existing rail vehicles. You can also replace the existing rail vehicles with the moved vehicles.

If you replace the existing vehicles on the track, you will be asked if you want to move the existing vehicles to the Phantom Track (see Paragraph 6.1).

6.2.2. Move All Rail Vehicles to Another Track

To move all of the rail vehicles on a track to another track, tap the Move All button.

6.2.3. Other Move Rail Vehicle Functions

The other functions in the Move Rail Vehicle From dialog (see Figure 49) operate in the same manner as those in the Track View dialog (see Figure 45) with the exception of the Delete function. The Delete function in the Move Rail Vehicle From dialog allows multiple rail vehicles to be selected for deletion. The Track View dialog only allows one rail vehicle at a time to be selected for deletion.

The following is a list of other functions in the Move Rail Vehicle From dialog and the paragraphs that describe them.

- Add - see Paragraph 6.1.1
- Delete - see Paragraph 6.1.2
- Delete All - see Paragraph 6.1.2
- Advance - see Paragraph 6.1.3
- View - see Paragraph 6.1.4
- Reverse List - see Paragraph 6.1.5

6.3. Find Rail Vehicle and Rail Vehicle Movement History

To access the Find Rail Vehicle function, tap the Find Rail Vehicle menu item in the Inventory menu. The Find Rail Vehicle dialog shown in Figure 51 will then appear.

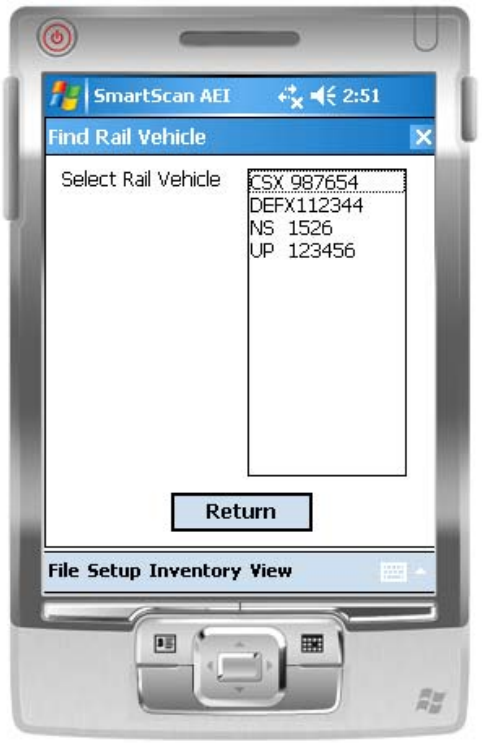

Figure 51 - Find Rail Vehicle Dialog

All of the rail vehicles in the portable reader's database will be displayed in alphabetical order in the Find Rail Vehicle dialog. To find a particular vehicle, tap on the vehicle identification, and the Rail Vehicle History display shown in Figure 52 will appear.

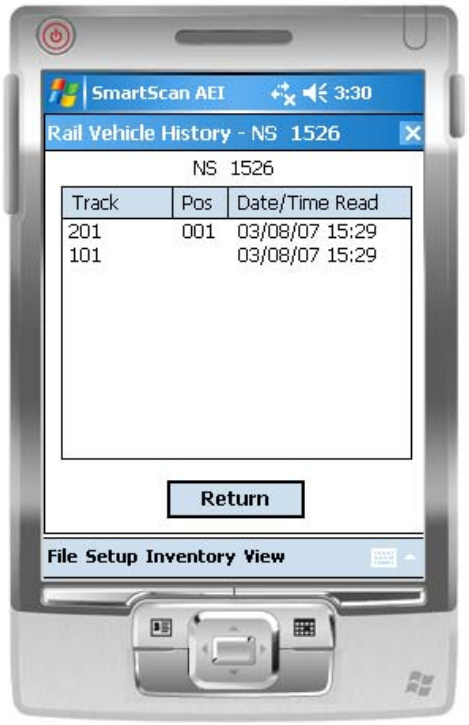

Figure 52 - Rail Vehicle History Display

The Rail Vehicle History display shows the rail vehicle's current location and the time it was moved to the current location. It also shows the vehicle's previous locations (up to 10).

6.4. Delete All Track Inventory

To delete all of the rail vehicles in the portable reader's database, tap the Delete All Track Inventory menu item in the Inventory menu.

7. TRACK TAGS

Track tags are AEI tags that are programmed with track information. Their purpose is to eliminate the need to manually enter this information when taking track inventory.

Before reading AEI tags on rail vehicles, the operator would read the Track tag at the starting point on the track. After reading all of the rail vehicles tags, the operator would read the Track tag at the ending point on the track. After reading the second Track tag, the portable reader will end taking inventory for the track and either send the track consist automatically (see Paragraph 5.7 for setting up automatic transmission) or ask the operator if he wants to send the inventory.

Track tags contain the track name, the orientation of the track (North to South, South to North, etc), the tag sequence number, whether the track has track spot locations, and the orientation of the track spot locations.

There can be up to 99 Track tags along the side of the track. Each has a different sequence number. The Track tag closest to the start of the track (if the track orientation is North to South, then the North end of the track would be the starting point) would have the lowest number and the Track tag farthest from the start of the track would have the highest number.

Track tags are standard AT5110 or AT5118 tags that are programmed in ASCII. The following table is the format of the Track tag:

Field	Starting Position	Field Size	Data
Tag Type Identifier	1	3	TRK
Track Orientation	4	1	N = North to South S = South to North W = West to East E = East to West
Sequence Number	5	2	Two-digits
Track Name	7	10	Up to 10 alpha/numeric characters
Track has Spot Location	17	1	Y = Has spot locations N = Does not have spot locations
Track Spot Orientation	18	1	N = North to South S = South to North W = West to East E = East to West

Examples:

TRKW99201 YW

TRKW01101 NW

8. SPOT TAGS

Spot tags are AEI tags that are programmed with track spot location information. Their purpose is to eliminate the need to manually enter track spot information when taking track inventory.

Before reading Spot tags, the operator would read the Track tag at his starting point on the track.

Prior to reading the tag on the rail vehicle the Spot tag for the vehicle's location should be read. When the rail vehicle's tag is read, the vehicle's location will be determined by the information in the last Spot tag read.

Spot tags contain the track name associated with the spot location and the spot name.

Spot tags are standard AT5110 or AT5118 tags that are programmed in ASCII. The following table is the format of the Spot tag:

Field	Starting Position	Field Size	Data
Tag Type Identifier	1	4	SPOT
Track Name	5	10	Up to 10 alpha/numeric characters
Spot Name	15	5	Up to 5 alpha/numeric characters

Examples:

SPOT201 2A

SPOT201 2B

9. OEM FUNCTIONS

As an option the portable reader allows other companies to incorporate their own application software into the device. These companies are referred to as Original Equipment Manufactures (OEMs).

To make it easier for OEM's to develop applications, the portable reader has several functions that allow OEM's to access tag data read by the portable reader and to send

OEM-application generated data to other computer systems as a file transfer to an FTP server or as a file attachment to an email.

9.1. Accessing Tag Data

When the portable reader reads a tag or barcode it writes a record into a text file called "tag data.txt". This file is located in a folder designated by the user in the OEM Setup function (see Paragraph 5.16).

The Tag Data file is a text file that has an individual record for each tag read. Each record is terminated with a carriage return character (hex OD) and line feed character (hex OA). All fields within the record are separated by commas.

There are four types of records in the Tag Data file. These are:

- Rail vehicle tag
- Track tag
- Spot tag
- Barcode data

Each of these records starts with a type designator in the first field of the record.

The following table shows the designator for each record type:

Type	Designator
Rail vehicle tag	RAIL
Track tag	TRK
Spot tag	SPOT
Barcode data	BAR

The following table is the layout of the record for the rail vehicle tag:

Field	Description	Values
1	Date and time when the tag was read	The field is in the following format MM/DD/YYYY(space)HH:MM MM = month of year DD = day of month YYYY = year HH = hour MM = minute
2	Record Designator	RAIL
3	Data format code	Two digits 51 = standard rail vehicle identification format (see AAR Specification S-918 for all codes)
4	Equipment group code	One to two digits 5 = locomotive 19 = railcar (see AAR Specification S-918 for all codes)
5	Vehicle initial (reporting marks)	Four alpha characters The field is filled with spaces if the vehicle initial is less than four characters
6	Vehicle number	One to six digits
7	Side indicator	Left or Right
8	Length in decimeters	1 to 4 digits
9	Number of axles	1 to 2 digits
10	Bearing code	1 digit from 0 to 7 (see AAR Specification S-918 for codes)
11	Platform code (for railcars only)	1 to 2 digits from 0 to 15 (see AAR Specification S-918 for codes)

The following are examples of records in this file:

01/16/2006 10:58,RAIL,"51","5","NS ","1526","Left","183","4","1"
01/16/2006 10:58,RAIL,"51","19","UP ","123456","Left","161","4","1","0"
01/16/2006 10:58,RAIL,"51","19","CSX ","987654","Right","193","6","1","0"
01/16/2006 10:58,RAIL,"51","19","DEFX","112344","Left","185","4","1","0"

The following table is the layout of the record for the Track tag:

Field	Description	Values
1	Date and time when the tag was read	The field is in the following format MM/DD/YYYY(space)HH:MM MM = month of year DD = day of month YYYY = year HH = hour MM = minute
2	Record Designator	TRK
3	Track Name	Up to 10 alpha/numeric characters
4	Track Orientation	none North-South South-North West-East East-West
5	Sequence Number	A two-digit number that represents the tag's position from the starting end of the track. The tag nearest the start would be 00 and the farthest 99 If the track is oriented North to South, the North most tag would be 00 and the South most 99
5	Track uses spot location	no spots spots
6	Spot Orientation	none North-South South-North West-East East-West

The following are examples of records in this file:

01/16/2006 10:58,TRK,"101","North-South","00 ","spots","North-South"
01/16/2006 10:58,TRK,"301","North-South","99 ","no spots","none"

The following table is the layout of the record for the Spot tag:

Field	Description	Values
1	Date and time when the tag was read	The field is in the following format MM/DD/YYYY(space)HH:MM MM = month of year DD = day of month YYYY = year HH = hour MM = minute
2	Record Designator	SPOT
3	Track Name	Up to 10 alpha/numeric characters
4	Spot	Up to 5 alpha/numeric characters

The following are examples of records in this file:

01/16/2006 10:58,SPOT,"101","2A"
01/16/2006 10:58,SPOT,"101","2B"

The following table is the layout of the record for the barcode read:

Field	Description	Values
1	Date and time when the tag was read	The field is in the following format MM/DD/YYYY(space)HH:MM MM = month of year DD = day of month YYYY = year HH = hour MM = minute
2	Record Designator	BAR
3	Raw Barcode Data	12-digits
4	Field Name	Up to 20 alpha/numeric characters Name of the field into which the barcode data will be entered
5	Data Translation	Up to 20 alpha/numeric characters Text the portable reader translated the 5-digit field (digits 6 thru 11) of the barcode data into

The following are examples of records in this file:

01/16/2006 10:58,BAR,"09920000514","Maint1","empty"
01/16/2006 10:58,BAR,"025262888883","User1",""

9.2. Sending OEM Data

An OEM application can send data to other computers over the wireless LAN via the portable reader's software. OEM data can either be sent as a file attached to an email or in a file that is transferred to an FTP server.

To send data as an email file attachment, the OEM application writes a transmit request text file into the folder the user has specified as the Transmit Folder in the OEM Setup function (see Paragraph 5.16).

When the portable reader sees a new text file in this file folder it decodes the first record in this file to see if it is an email request or an FTP transfer request.

The transmit request file consists of a number of records which are each terminated with a carriage return character (hex OD) and line feed character (hex OA). All fields within the record are separated by commas.

The first record in the transmit request file is always the SETUP record, which specifies if it is an email request or an FTP transfer request.

9.2.1. Email Transmit Request File

To send OEM data via email, information on the email outbound server must be entered in the Email Setup dialog (see Paragraph 5.9).

The email transmit request file consists of a number of record segments. These segments must be written in the following order:

SETUP
FROM
TO (up to 10 TO segments)
TO
TO
.
.
SUBJECT
BODY
FILE
(OEM Application Data)

The following is the layout of each segment record:

SETUP Segment

Field	Description	Values
1	Segment code	SETUP
2	Transmit type	EMAIL

Example: SETUP,EMAIL

FROM Segment

Field	Description	Values
1	Segment code	FROM
2	Reply email address	1 to 40 alpha/numeric characters

Example: FROM,tomlevine@signalcc.com

TO Segment

Field	Description	Values
1	Segment code	TO
2	To email address	1 to 40 alpha/numeric characters

Example: TO,sales@signalcc.com
TO,aeitag@signalcc.com

Up to 10 TO segments

SUBJECT Segment

Field	Description	Values
1	Segment code	SUBJECT
2	Subject text	1 to 40 alpha/numeric characters

Example: SUBJECT,Test Portable Reader Email

BODY Segment

Field	Description	Values
1	Segment code	BODY
2	Email body text	1 to 800 alpha/numeric characters in quotations

Example: BODY,"This is a test email sent from a portable reader."

FILE Segment

Field	Description	Values
1	Segment code	FILE
2	Name of the file that will be attached to the email and contains the OEM's application data	1 to 255 alpha/numeric characters

Example: FILE,emailtest.txt

After it writes the FILE segment, the OEM application writes its data into the transmit request file. The amount of user data that can be written is limited by the amount of free file data area in the portable reader's PDA. The portable reader software will write this data to a temporary file and attach it to the email. The name of the attached file is the file name specified in the FILE segment.

The following is an example of the email transmit request file:

SETUP,EMAIL
FROM,tomlevine@signalcc.com
TO,aei@signalcc.com
TO,sales@signalcc.com
TO,tomlevine@signalcc.com
SUBJECT,Test Email
BODY,"This is a test email."
FILE,emailtest.txt
Test data 1
Test data 2
Test data 3

9.2.2. FTP Transmit Request File

The FTP transmit request file consists of a SETUP segment and OEM application data. The information is written in the following order

SETUP
(OEM Application Data)

The following is the layout of each segment record:

SETUP Segment

Field	Description	Values
1	Segment code	SETUP
2	Transmit type	FTP
3	Server name or DEFAULT	0 to 40 alpha/numeric characters If "DEFAULT" is in this field, this is the last field in the segment and the portable reader will use the FTP server setting in the FTP Setup dialog (see 5.12) If no value is in this field, the portable reader will use the value in the IP address field to connect to the FTP server
4	IP address of the FTP server	IP address format xxx.xxx.xxx.xxx where XXX is any number between 0 and 255
5	Listening port	1 to 4 digits usually 21
6	Directory in which to store the file on the FTP server	1 to 40 alpha/numeric characters
7	User name	1 to 40 alpha/numeric characters
8	Password	1 to 40 alpha/numeric characters
9	File name of the file to be stored	1 to 255 alpha/numeric characters

Examples: SETUP,FTP,ftp.signalcc.com,,21,www,signacc,sftsha12,ftptest.txt
SETUP,FTP,DEFAULT

After the SETUP segment, the OEM application writes its data into the transmit request file. The amount of user data that can be written is limited by the amount of free file data area in the portable reader's PDA. The portable reader software will write this data to a temporary file and transfer it to the FTP server. The name of the stored file is the file name specified in the SETUP segment.

The following is an example of the FTP transmit request file:

SETUP,FTP,ftp.signalcc.com,192.168.0.1,21,www,signalcc,7yg2512aa,ftptest.txt
Test data 1
Test data 2
Test data 3

9.2.3. OEM Transmit Request Status

The portable reader, when it reads an OEM transmit request file, checks the file for errors. If it finds an error it writes an error record into a file called "oem status log.txt" which is located in the same folder as the transmit request files. The following is the format of an error record:

Error,"transmit request file name","error description".

The following are examples of error records:

Error,"testftp.txt","no FTP file name in the first record of the OEM FTP transmit file"
Error,"testftp.txt","missing password in the first record of the OEM FTP transmit file"
Error,"testemail"," could not find carriage return line feed at the end of "FROM" record in the OEM Email transmit file"

A record will also be written in the "oem status log.txt" file when the data in a transmit request file is successfully sent.

The following are the email and FTP formats for a sent status record:

SENT,mm/dd/yyyy hh:mm, EMAIL, "transmit request file name"
SENT,mm/dd/yyyy hh:mm, FTP, "transmit request file name"

10. OPTIONS

The SmartScan Model 2400 Portable AEI Reader has five software options. Two of these options allow OEMs to access AEI tag and barcode data and send files as attachments to emails or directly to an FTP Server. The other three options allow Bluetooth communications to various devices.

The OEM version of the portable reader allows other companies to develop their own applications. These applications can be easily incorporated into the portable reader's PDA. The OEM version provides an easy interface so that AEI tag and barcode data can be accessed by an OEM's application and sent to other systems via an email or to an FTP server (see Paragraph 9).

Because the portable reader's PDA has Bluetooth communication capabilities, the portable reader can communicate with various external devices. Data received from these devices can be entered into each rail vehicle's data fields.

Currently none of the Bluetooth communication interfaces have been implemented. The three planned interfaces are:

- Serial interface, which will allow serial RS-232 devices to send and receive data from the portable reader.
- Telephone interface, which will allow the portable reader to access the internet through a Bluetooth enabled GPSR telephone.
- Global Position Satellite interface, which will allow the portable reader to record the location where a tag was read.

To see what options are available in the portable reader, select the File menu and then tap the Installed Options menu item in the pop-up menu. This will cause the Installed Options display shown in Figure 53 to appear.

Figure 53 - Installed Options Display

11. ABOUT

To find information about the software version and the unit's serial number, tap the About menu item under the File menu, and the About display shown in Figure 54 will appear.

Figure 54 - About Display

12. MAINTENANCE AND COMMUNICATION LOGS

To help find problems with the portable reader, the portable reader maintains two logs. These are the maintenance log and the communications log.

12.1. Maintenance Log

The maintenance log is located in a text file called "maint log.txt". It contains information about when various events occurred and if internal problems were detected.

To view the maintenance log tap the Maintenance Log menu item under the View menu.

The following is an example of information contained in this log:

12/29/2005 12:48 Start of program
12/29/2005 12:48 TCP/IP Initialized Name = "Tom_Levine_PDA" IP = "127.0.0.1"
12/29/2005 12:48 Request to turn off wireless radio
12/29/2005 12:48 Could not open comm log file for clean up

```
12/29/2005 12:49  Program closed
12/29/2005 16:30  Start of program
12/29/2005 16:30  TCP/IP Initialized Name = "Tom_Levine_PDA" IP = "127.0.0.1"
12/29/2005 16:31  Program closed
01/13/2006 10:14  Start of program
01/13/2006 10:14  TCP/IP Initialized Name = "Tom_Levine_PDA" IP = "192.168.55.101"
01/13/2006 10:14  0 rail vehicle(s) assigned to tracks were deleted, 4 tag record(s) not assigned to
tracks were deleted.
01/16/2006 12:01  Manual clear inventory request
```

To help find problems, Softrail may need to obtain a copy of the maintenance log. This can be easily sent via email by tapping on the Send Maintenance Log to Softrail menu item under the File menu. For this file to be sent via email the portable reader's PDA must have a connection to the internet. It is not necessary to enter information in the Email Setup dialog (see Paragraph 5.9) for the maintenance log to be sent.

12.2. Communications Log

The communications log is located in a text file called "comm log.txt". It contains information about communications between the portable reader's PDA and other devices including the internal AEI RF reader. The internal AEI RF reader is connected to the PDA's serial communications port.

To view the communications log, tap the Communications Log menu item under the View menu.

The following is an example of information contained in this log:

```
12/29/2005 12:49 R (COM1) Received "*P=H@!?8MQD       S"
12/29/2005 12:49 R (COM1) Received "FX03!XD H1D       S"
12/29/2005 12:49 R (COM1) Received "FC2:?$@:P2D       S"
12/29/2005 12:49 R (COM1) Received "GCUH!MM@N1D       S"
```

To help find problems, Softrail may need to obtain a copy of the communications log. This can be easily sent via email by tapping on the Send Communications Log to Softrail menu item under the File menu. For this file to be sent via email the portable reader's PDA must have a connection to the internet. It is not necessary to enter information in the Email Setup dialog (see Paragraph 5.9) for the communications log to be sent.

13. FILE MAINTENANCE

The portable reader software generates a number of files and continuously adds records to these files. Periodically, records in these files must be deleted so that the portable reader does not run out of storage area.

The following table describes the rules for deleting records from the files:

File Name	Record Deletion Rules
Maintenance Log "maint log.txt"	Does not allow file to exceed 200,000 bytes. Deletes oldest records to maintain this size.
Communications Log "comm log.txt"	Does not allow file to exceed 200,000 bytes. Deletes oldest records to maintain this size.
OEM Tag Data "tag data.txt"	Does not allow file to exceed 20,000 bytes. Deletes oldest records to maintain this size.
OEM Status Log "oem status.txt"	Does not allow file to exceed 20,000 bytes. Deletes oldest records to maintain this size.
Rail Car Data Base	Deletes all tag records for vehicles that have not been assigned to a track and were last read over 3 days ago. Deletes all tag records for vehicles that have been assigned to a track and were last read or moved over 30 days ago.

14. TEXT FILE FORMAT

The portable reader can send track inventory information in two types of comma delimited text file formats.

These are referred to as EDI and Excel text files.

The EDI format is a comma delimited text file. This format uses Electronic Data Interchange (EDI) type records. This file has many different types of records and is generally used for computer-to-computer communications.

The second format is also a comma delimited text file. We refer to it as Excel file format since it was designed to be easily imported into most commercial word processing, spreadsheet and database programs.

The following describes these formats:

14.1. EDI Text File Format

The EDI text file format consists of a number of segment records, which are each terminated with a carriage return character (hex 0D) and line feed character (hex 0A).

There are seven segment record types. The following defines the segment types and their associated codes:

Segment Code	Maximum Number in File	Description
START	1	Message header segment
TRACK	1	Track segment - contains the track name and the orientation of the vehicle inventory
USER	1	User segment - contains the names of user defined fields
RAIL1	200	Rail 1 segment – contains time on the track, the rail vehicle's tag data and system defined fields
RAIL2	200	Rail 2 segment – contains data in the user defined fields
RAIL3	200	Rail 3 segment (optional) – contains user comments
END	1	Message trailer segment

A segment code is at the beginning of each segment. A comma follows the segment code and commas separate the remaining fields in the segment, which are enclosed in quotes. The following is the general layout of all types of segments:

Segment code,"field 1","field 2","field 3",.....,<carriage return character><line feed character>

The segments are written in the following order:

START
TRACK
USER
RAIL1
RAIL2
RAIL3 (optional)
RAIL1
RAIL2
RAIL3 (optional)
.
.
END

The following is the layout of each segment record:

START Segment

Field Number	Data Name	Data Format	Description
ST1	Segment Code	START	Segment code
ST2	Version	Numeric 4 digits	Version number of the file format
ST3	Date/Time	MM/DD/YYYY<space> HH:MM	Date and time the file was created MM = month DD = day of month YYYY = year HH = hour SS = second
ST4	Sequence Number	Numeric 4 digits	The sequence number of the file from 0 to 9999. This sequence number is incremented each time a new file is created. When it reached 10,000, it is reset to 0

Example: START,"0001","12/19/2005 12:11","0021"

TRACK Segment

Field Number	Data Name	Data Format	Description
TRK1	Segment Code	TRACK	Segment code
TRK2	Track	Alpha/Numeric 1 to 10 characters	Track where the rail vehicles are located
TRK3	Orientation	NORTH SOUTH EAST WEST	The end of the track where the rail inventory begins

Example: TRACK,"301","WEST"

USER Segment

Field Number	Data Name	Data Format	Description
USR1	Segment Code	USER	Segment code
USR2	Field Name 1	Alpha/Numeric 1 to 20 characters	Name of user defined field 1
USR3	Field Name 2	Alpha/Numeric 1 to 20 characters	Name of user defined field 2
USR4	Field Name 3	Alpha/Numeric 1 to 20 characters	Name of user defined field 3
USR5	Field Name 4	Alpha/Numeric 1 to 20 characters	Name of user defined field 4
USR6	Field Name 5	Alpha/Numeric 1 to 20 characters	Name of user defined field 5
USR7	Field Name 6	Alpha/Numeric 1 to 20 characters	Name of user defined field 6
USR8	Field Name 7	Alpha/Numeric 1 to 20 characters	Name of user defined field 7

Example: USER,"commodity","not assigned 2",”not assigned 3","not assigned 4","not assigned 5",”not assigned 6",”not assigned 7"

RAIL 1 Segment

Field Number	Data Name	Data Format	Description
RAIL101	Segment Code	RAIL1	Segment code
RAIL102	Position	Numeric 1 to 3 digits 1 to 200	Position vehicle is in from end of the track
RAIL103	Equipment Code	Numeric 1 to 2 digits	Type of vehicle 5 = locomotive 19 = railcar
RAIL104	Vehicle Initial	Alpha 4 characters	Vehicle initial (reporting marks) The field is filled with spaces if the vehicle initial is less than four characters
RAIL105	Vehicle Number	Numeric 1 to 6 digits	Vehicle number
RAIL106	Date/Time	MM/DD/YYYY<space> HH:MM:SS	Date and time the vehicle was moved to the track MM = month DD = day of month YYYY = year HH = hour MM = minute SS = second
RAIL107	Track Spot	Alpha/Numeric 0 to 5	Spot name or "None" if spot locations are not used
RAIL108	Spot Position	Numeric 1 to 3 digits	Spot position in the track starting with one.
RAIL109	Tag Side	Left Right	Side indicator reported by AEI tag
RAIL110	Tag Length	Numeric 1 to 4 digits	Vehicle's length reported by AEI tag in decimeters
RAIL111	Tag Axle	Numeric 2 digits	Vehicle's axle count reported by AEI tag
RAIL112	Tag Bearing Code	Numeric 1 digit	Vehicle's bearing code reported by AEI tag

RAIL113	Tag Platform Code	Numeric 1 to digits or blank if locomotive	Platform code reported by tag
RAIL114	Maintenance Field 1	Alpha/Numeric 0 to 20 characters	Maintenance field 1
RAIL115	Maintenance Field 2	Alpha/Numeric 0 to 20 characters	Maintenance field 2
RAIL116	Status Field	Alpha/Numeric 0 to 20 characters	Status field
RAIL117	Consist Field	Alpha/Numeric 0 to 20 characters	Consist field

Example:

RAIL1,"1","5","NS ","1526","01/17/2006 10:41:54","None","1","Left","183","4","1","","","","","",""

RAIL 2 Segment

Field Number	Data Name	Data Format	Description
RAIL201	Segment Code	RAIL2	Segment code
RAIL202	Position	Numeric 1 to 3 digits 1 to 200	Position vehicle is in from end of the track
RAIL203	Equipment Code	Numeric 1 to 2 digits	Type of vehicle 5 = locomotive 19 = railcar
RAIL204	Vehicle Initial	Alpha 4 characters	Vehicle initial (reporting marks) The field is filled with spaces if the vehicle initial is less than four characters
RAIL205	Vehicle Number	Numeric 1 to 6 digits	Vehicle number
RAIL206	User Field 1	Alpha/Numeric 0 to 20 characters	User defined field 1
RAIL207	User Field 2	Alpha/Numeric 0 to 20 characters	User defined field 2

RAIL208	User Field 3	Alpha/Numeric 0 to 20 characters	User defined field 3
RAIL209	User Field 4	Alpha/Numeric 0 to 20 characters	User defined field 4
RAIL210	User Field 5	Alpha/Numeric 0 to 20 characters	User defined field 5
RAIL211	User Field 6	Alpha/Numeric 0 to 20 characters	User defined field 6
RAIL212	User Field 7	Alpha/Numeric 0 to 20 characters	User defined field 6

Example: RAIL2,"1","5","NS ","1526","coal","","","","","",""

RAIL 3 Segment

Field Number	Data Name	Data Format	Description
RAIL301	Segment Code	RAIL3	Segment code
RAIL302	Position	Numeric 1 to 3 digits 1 to 200	Position vehicle is in from end of the track
RAIL303	Equipment Code	Numeric 1 to 2 digits	Type of vehicle 5 = locomotive 19 = railcar
RAIL304	Vehicle Initial	Alpha 4 characters	Vehicle initial (reporting marks) The field is filled with spaces if the vehicle initial is less than four characters
RAIL305	Vehicle Number	Numeric 1 to 6 digits	Vehicle number
RAIL306	Comments Field	Alpha/Numeric 0 to 200 characters	Vehicle comments field

Example: RAIL3,"1","5","NS ","1526","Broken glad hand"

END Segment

Field Number	Data Name	Data Format	Description
END1	Segment Code	END	Segment code
END2	Segment count	Numeric 0 to 4 digits	Number of segment records in the file not including the END segments

Example: END,"11"

The following is an example of a track inventory text file:

```
START,"0001","01/17/2006 13:21:55","0002"
TRACK,"201","WEST"
USER,"commodity","not assigned 2","not assigned 3","not assigned 4","not assigned 5","not assigned
6","not assigned 7"
RAIL1,"1","5","NS  ","1526","01/17/2006 10:41:54","None","1","Left","183","4","1","","","","","",""
RAIL2,"1","5","NS  ","1526","coal","","","","","",""
RAIL3,"1","5","NS  ","1526","broken glad hand"
RAIL1,"2","19","UP  ","123456","01/17/2006
10:42:06","None","2","Left","161","","4","1","0","","","",""
RAIL2,"2","19","UP  ","123456","","","","","","","",""
RAIL1,"3","19","CSX ","987654","01/17/2006
10:42:08""None","3",,"Right","193","","6","1","0","","","",""
RAIL2,"3","19","CSX ","987654","timber","","","","","","",""
RAIL1,"4","19","DEFX","112344","01/17/2006
10:42:10","None","1","Left","185","","4","1","0","","","",""
RAIL2,"4","19","DEFX","112344","","","","","","","",""
END,"12"
```

14.2. Excel Text File

The Excel text file consists of a header record and data records. The first record in the file is the header record, which gives a description of data in each field of the data records.

Each record is terminated with a carriage return character (hex OD) and line feed character (hex OA).

The following is an example of the header record:

"Vehicle ID","Track","Position","Type","Time","Manual","Status","Consist","Maint 1", "Maint 2,"User 1","User 2","User 3","User 4","User 5","User 6","User 7"

The "User 1" through "User 7" fields will contain the field names that were entered in the User Defined Fields dialog (see Paragraph 3.3).

Data Record

Field Number	Data Name	Data Format	Description
1	Vehicle ID	Alpha 4 characters Numeric 1 to 6 digits AAAANNNNNN	Vehicle initial and number The initial is filled with spaces if the vehicle initial is less than four characters
2	Track	Alpha/Numeric 1 to 10 characters	Name of the track the vehicle is located

3	Position on track	Alpha 1 character Dash Numeric 3 digits A - NNN	The first character designates the end of the track where the first position is located. N = North S = South W = West E = East The next 1 to 3 digits indicates the position of the vehicle on the track
4	Type of Vehicle	Diesel Railcar	Type of rail vehicle
5	Date/Time	MM/DD/YYYY<space> HH:MM:SS	Date and time the vehicle was moved to the track MM = month DD = day of month YYYY = year HH = hour MM = minute SS = second
6	Manual	Yes No	Indicates if the vehicle was entered manually into the portable reader (Yes) or read from an AEI tag (no)
7	Status	Alpha/Numeric 0 to 20 characters	Status field
8	Consist	Alpha/Numeric 0 to 20 characters	Consist field
9	Maintenance Field 1	Alpha/Numeric 0 to 20 characters	Maintenance field 1
10	Maintenance Field 2	Alpha/Numeric 0 to 20 characters	Maintenance field 2
11	User 1	Alpha/Numeric 0 to 20 characters	User field 1
12	User 2	Alpha/Numeric 0 to 20 characters	User field 2
13	User 3	Alpha/Numeric 0 to 20 characters	User field 3

14	User 4	Alpha/Numeric 0 to 20 characters	User field 4
15	User 5	Alpha/Numeric 0 to 20 characters	User field 5
16	User 6	Alpha/Numeric 0 to 20 characters	User field 6
17	User 7	Alpha/Numeric 0 to 20 characters	User field 7
18	User 8	Alpha/Numeric 0 to 20 characters	User field 8

Example:

"NS 1526",”101”,”W - 004",”Railcar”,”01/17/2008 10:41:54","No","empty","", "bad glad hand",””,””,””,””,””,””,””,””,””,””

15. TECHNICAL SUPPORT AND UPDATES

Periodically Softrail issues maintenance releases and new versions of this program. Maintenance releases are free and correct problems found with the program and/or provide minor enhancements to the program. Before contacting us with problems we suggest that you contact your sales representative and review the issues with him and then check our web page at www.aeitag.com to insure that you have the latest maintenance release of the program.

Technical support is free for the first one year after purchase, but is limited to two hours of support for each portable reader that is purchased. Time is charged in blocks of 15 minutes.

A maintenance agreement can be purchased to extend the period of technical support or add additional hours.

For technical support or more information on the maintenance agreement contact Softrail at:

Softrail, Inc.
1098 Venetia Road
Eighty Four, PA 15330

Tel. 888 872-4612 (toll free US and Canada only) or 724 942-1473
Fax. 724 942-1480
E-mail aei@signalcc.com
Web Page www.aeitag.com

16. SYSTEM SPECIFICATIONS

Maximum Number of Vehicles in System	5,000
Maximum Number of Vehicles per Track	200
Maximum Number of Tracks	100
Maximum Number of Messages Pending Transmission	200
Maximum Character Size of Track Name	10
Maximum Number of User Defined Fields	7
Maximum Character Size of User and System Defined Fields	20
Maximum Vehicle Comments Field's Character Size per Vehicle	200
Maximum Vehicle Comments Field's Character Size per System	50,000

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